MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for January, 1899, is based on about 2,762 reports from stations occupied by regular and voluntary observers, classified as follows: 162 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,385 from voluntary observers; 96 received through the Southern Pacific Railway Company; 29 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 10 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological and Magnetic Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The storms of January, 1899, presented no unusual features.

From the 1st to the 4th a disturbance crossed the northern districts from the Pacific to the St. Lawrence Valley, causing wind velocities of 50 miles an hour on the north Pacific coast the night of the 1st, and strong gales over the Lake region during the 4th. Following the passage of this storm a marked fall in temperature occurred in the lower Missouri and upper Mississippi valleys on the 4th, and by the morning of the 5th the temperature had fallen to zero in northern Iowa.

Two storms appeared over Texas or the Rio Grande Valley, one advancing from Texas to the St. Lawrence Valley from the 5th to the 7th, and the other from the Rio Grande Valley to the region north of the St. Lawrence during the 13th and 14th. The first of these storms caused heavy snow in the upper Ohio Valley and the lower Lake region on the 6th, and heavy gales the night of the 6th over the lower Lakes and along the north Atlantic coast. The Rio Grande Valley storm reached the lower Lake region the morning of the 14th, and during the day and night of that date caused high winds from the lower Lake region over the middle Atlantic and New England coasts.

The fourth storm of the month, which appeared on the 22d as a trough of low barometric pressure extending from Minnesota to Texas, drifted eastward over the Lake region during the 23d and reached the Atlantic coast on the 24th. During the night of the 24th this disturbance increased rapidly in intensity and caused gales of 50 to 60 miles an hour along the north Atlantic coast, with a maximum velocity of 68 miles per hour at New York City, 56 at Cape Henry, and 48 at Woods Hole.

The final important storm of the month moved from the British Northwest Territory to the St. Lawrence Valley from the 24th to the 26th. While crossing the Lake Superior region this storm developed great strength and was attended during the day of the 26th by gales of 50 to 70 miles an hour over the Great Lakes. The night of the 26th correspondingly high wind velocities were registered along the north Atlantic coast. Following the passage of this disturbance the most important cold wave of the month overspread the upper Missouri Valley the night of the 27th. By the morning of the 28th the temperature was 22° to 26° below zero in North Dakota, and by the morning of the 29th the line of zero temperature was traced to southern Missouri and southern Kansas. During the last three days of the month a cold wave advanced from the northern Rocky Mountain region to the west Gulf and Middle Atlantic States, carrying zero temperatures to southern Kansas and freezing weather to west-central Texas on the 30th, and zero temperature to Oklahoma and northwestern Texas by the morning of the 31st.

Reports indicate that the warnings issued in connection with these storms and cold waves were of material value to shipping and transportation interests, and that in the truck-

ing districts of the Southwest, and more especially in Texas, the special warnings of freezing weather prompted measures of protection which resulted in averting large losses of produce.

The value of the warnings of freezing weather to the truck farmers is indicated by the following letter addressed to Dr. I. M. Cline, section director, Weather Bureau, Galveston, Tex., by Mr. B. F. Johnson, President Gulf Coast Horticultural Association:

> I want to thank you, and through you, the Weather Bureau people for the promptness and accuracy of your warnings. We could not get along without them.
>
> Four years ago you began giving us these warnings and since that time our truck farming has *increased ten fold* and will continue to grow under the fostering care of the Weather Bureau.
>
> Your forecasts have been, in the main, correct to a degree, and I trust you will be permitted to continue the good work.

CHICAGO FORECAST DISTRICT.

Warnings were issued on the 4th for the cold wave which covered the eastern portion of the district on the 5th. No other cold wave of importance appeared until the 26th, the weather, as a rule, continuing comparatively mild in the meantime. In rapid succession three areas of high barometer with extreme cold moved across the district from the northwest, the first appearing the morning of the 26th, the second the morning of the 28th, and the third during the day of the 29th. Signals were ordered and warnings sent well in advance of the cold waves, except in the extreme Northwest, before the sudden development of the 28th.

The temperature forecasts have been closely watched by various interests, the movement of perishable goods being absolutely controlled by the forecasts during the winter months. The shipping interests which maintain winter service on Lake Michigan have been furnished information regarding winds whenever such information might be of value, and on the evening of the 25th a warning was issued that it would be dangerous to leave port, especially to vessels bound to or from points on the east shore of the lake.—*H. J. Cox, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

Prior to January 1 there had been a period of extreme drought which had prevailed in this State for twenty-one months. On December 31 a general rain warning was distributed throughout northern California, and on the morning of the 1st a similar warning was distributed in southern California. Rain forecasts were generally made for the next two weeks, when there was much rainfall in the State, an average of 3.50 inches, or more than one-half of an inch above the January normal, which has rendered it decidedly probable that good crops will be obtained from the northern half of the State and has prevented serious injury to stock and grain prospects in the southern part of the State.

On January 6 a southeast storm signal was hoisted at Eureka, and on the 9th at San Francisco and points north, while the information signal was displayed at Port Harford. These signals were continued on the 10th and storm signals ordered as far south as Ventura, and at 8 a. m. information signals were ordered at Los Angeles and San Diego. The information signals were changed to storm at 2:30 p. m. of the same date. Storm signals were continued from Ventura northward on the coast on January 11. During the period that these signals were displayed one of the most severe storms of which we have a record prevailed along the entire coast, verifying the storm signals at all points. Some damage resulted, but undoubtedly the injury was greatly diminished owing to the display of the signals, for hardly a vessel attempted to leave any California port during the time the signals were displayed. In many instances regular liners remained in port; vessels that were out were in some instances a number of days overdue owing to the storm; the schooner *Jewel* was wrecked off the Mendocino coast; the river steamers between this point and Sacramento were forced to seek places of safety; the freight ferryboat *Thoroughfare* nearly capsized owing to the cars being thrown from the track; a large amount of injury was done to streets, sewers, etc. At the towns on the north side of the bay considerable injury resulted; several small houses were blown down and others were unroofed. Considerable damage was done to the sea wall at Sausalito; piling was washed out, railroad tracks flooded, etc.—*W. H. Hammon, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

Vessels remained in port during wind signals. During the gale of the 13–14th, on Puget Sound, the ship *Adelana*, at anchor at Tacoma, sunk. The disaster was due to the manner in which the ship was moored. She was held by a cable and ballast logs and the latter moved. She had discharged her freight and ballast and a slight change in position was sufficient to cause her to dip, fill with water, and sink.

The snow forecasts issued were of great benefit to railroad companies, farmers, and stock men.

The river warnings issued on the 21st were of special value to merchants on Front street. Many were preparing to move goods from cellars, but desisted when assured that there was no danger from flood.—*B. S. Pague, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were ten highs and fourteen lows sufficiently well defined to be traced on Charts I and II. The accompanying table exhibits some of the principal points relating to the place of origin and disappearance, the duration and velocity of these conditions, and the following more particular description is added:

Highs.—Six of the highs were first noted to the north of Montana, and the other four in the middle Rocky Mountain plateau. The general path was toward the east and northeast. One was last seen in the west Gulf, five off the south Atlantic coast, and three near Newfoundland. No severe cold waves were experienced during the month. On the evening of 4th, as high No. II was central in the north Rocky Mountain region, a fall in temperature of 35° in twenty-four hours occurred at La Crosse, and of 32° at Dubuque and Keokuk. The next morning Keokuk and Davenport experienced a fall of 40°. On the morning of 7th, as high No. III approached the middle Gulf States, there was a fall of 40° at Atlanta, and of 38° at Montgomery. On morning of 26th, as high No. VIII moved to the north of Dakota, a fall in temperature of 54° occurred at Qu'Appelle, and of 50° at Williston. On the morning of 27th, as the same high moved to northeast Kansas, there was a fall of 46° at Parry Sound, and of 44° at Alpena.

Lows.—Of the storms of the month two were first noted off the north Pacific coast and two off the south Pacific. Four were first seen to the north of Montana and three near Manitoba, and the three remaining were first seen in Texas. The path of all the storms was east and northeast, and twelve of them disappeared over or near Newfoundland. No. IV was last seen in the middle Gulf, and XII disappeared off the middle Atlantic coast.

The highest winds of the month were reported as follows: On 7th, p. m., as low area No. II passed down the St. Lawrence Valley, Buffalo reported a wind of 72 miles an hour. On evening of 14th, as No. VI approached northeast, Buffalo again reported the highest wind of any station, 64 miles. On a. m. of 25th, as No. X passed into Nova Scotia, New York City experienced 64 miles. On p. m. of 26th, as No. XI passed down the St. Lawrence Valley, Buffalo reported 72 miles, and twenty-four hours later, when the storm reached the Gulf of St. Lawrence, New York City reported 64 miles. Finally, on evening of 28th, as low No. XII passed off the south Atlantic coast, it caused a wind of 60 miles an hour at Hatteras.—*H. A. Hazen, Professor.*

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	*29, a. m.	55	114	5, a. m.	32	79	3,090	7.0	441	18.4
II	3, p. m.	47	113	6, p. m.	47	62	2,580	3.0	860	35.8
III	5, a. m.	47	116	9, p. m.	36	76	2,850	4.0	712	29.7
IV	8, a. m.	51	101	13, p. m.	46	63	1,900	5.5	346	14.4
V	13, p. m.	41	117	17, a. m.	48	55	3,660	3.5	1,046	43.6
VI	15, a. m.	51	109	21, a. m.	32	80	2,460	6.0	410	17.1
VII	20, p. m.	39	112	24, p. m.	46	56	3,480	4.0	870	36.2
VIII	24, a. m.	49	103	26, a. m.	34	75	2,160	2.0	1,080	45.0
IX	25, p. m.	52	109	28, a. m.	28	97	1,800	2.5	720	30.0
X	27, p. m.	54	108	30, p. m.	33	75	2,700	3.0	900	37.5
Total							26,680	40.5	1,385	307.7
Mean of 10 paths							2,668		738	30.8
Mean of 40.5 days									659	27.5
Low areas.										
I	2, a. m.	47	126	5, p. m.	48	52	3,420	3.5	977	40.7
II	4, p. m.	28	101	7, p. m.	49	55	2,850	3.0	950	39.6
III	7, a. m.	54	112	9, a. m.	47	54	2,880	2.0	1,440	60.0
IV	7, p. m.	32	114	10, p. m.	30	89	1,560	3.0	520	21.7
V	9, p. m.	49	127	13, p. m.	50	94	1,530	4.0	382	15.9
VI	12, p. m.	32	99	15, p. m.	47	55	2,490	3.0	830	34.6
VII	15, a. m.	49	92	18, a. m.	48	56	1,740	3.0	580	24.2
VIII	19, p. m.	55	113	22, p. m.	49	53	2,790	3.0	930	38.8
IX	20, p. m.	53	116	24, p. m.	50	65	3,300	4.0	825	34.4
X	23, a. m.	33	96	25, p. m.	48	51	2,460	2.5	984	41.0
XI	23, p. m.	52	114	27, p. m.	50	54	2,850	4.0	712	29.7
XII	26, p. m.	27	99	28, p. m.	36	75	1,620	2.0	810	33.8
XIII	27, a. m.	52	98	29, p. m.	47	52	2,040	2.5	816	34.0
XIV	29, a. m.	34	115	† 1, p. m.	45	53	3,720	3.5	1,063	44.3
Total							35,250	43.0	11,819	492.7
Mean of 14 paths							2,518		844	35.2
Mean of 43.0 days									820	34.2

*December. †February.

RIVERS AND FLOODS.

At the close of December, 1898, the Missouri River was frozen over to below Omaha, and continued so throughout the month of January, 1899. From St. Joseph, Mo., to the mouth of the Missouri the water fell steadily owing to the advance of the cold weather, and on the 31st, the river was practically closed as far as Hermann, Mo., 75 miles above the mouth.

The Mississippi was also frozen over as far south as Hannibal, and fell steadily in the open portion from below Hannibal to Cairo.

In the Ohio a rise began in the upper river on the 14th, reaching Cairo on the 19th, but no extremely high stages were reached, except at Evansville where the river was above the danger line from the 14th to the 23d, inclusive, reaching 39.1 feet on the 18th, or 4.1 feet above the danger line. Lowlands were submerged after the 12th, but aside from the temporary inconvenience to the farmers, no loss or damage resulted.

Previous to this rise, however, there had been another marked, though not prolonged, rise in the Ohio and its tributaries on account of the substantial rains of the 4th, 5th, and 6th. In the Cumberland River stages from the danger lines to more than 8 feet above were general, but no reports of damage were received. In the Tennessee River at Johnsonville the water was from 1 to 3 feet above the danger line from the 10th to the 15th, inclusive. In the Emory River above Kingston, Tenn., a log boom broke on the 7th during a heavy rise in the mountain streams, and 1,000,000 feet of logs were swept away. At Chattanooga there was heavy drift from the 7th to the 10th, becoming lighter and ending on the 11th.

In the Mississippi River below Cairo the rise was steady after the 9th, cresting at Memphis on the 22d, and was still in progress at the close of the month from Vicksburg southward. A considerable volume of water also came out of the Yazoo River, which rose steadily after the 4th of the month.

The Ouachita at Camden, Ark., reached the danger line of 39 feet on the 18th, and fell rapidly thereafter. At Monroe, La., there was a steady rise after the 4th, but no high stages were reached.

A similar condition of affairs prevailed along the Red River.

The Atchafalaya rose steadily at the rate of about 0.5 foot per day from the beginning to the end of the month, reaching the danger line on the last day.

Low stages prevailed generally in the Susquehanna, except in the vicinity of Wilkesbarre. In the Wyoming Valley the rains from the 4th to the 7th caused the breaking of the ice gorge, and a rise of 15 feet in the river in four days, the water reaching a stage of 21 feet on the 7th, or 7 feet above the danger line, when the gorge broke. It remained above the danger line until the 20th. Many cellars in the lower end of the city were flooded, and some water came into the main portion. Interurban traffic was almost completely interrupted while the water was at its highest stage.

The James River at Richmond reached the flood stage on the 7th, and read 13.5 feet on the gauge on the 8th, or 1.5 foot above the danger line. This rise was due to the heavy rains of the 5th and 6th, and warnings were given as soon as reports from the upper river were received. A stage of 12 feet was forecast for 8 p. m. of the 7th, and the stage actually reached at that hour was 12.2 feet, a remarkably accurate forecast. Supplementary warnings were issued later of a 13-foot stage to arrive during the night. Some cellars were flooded, and there was some interruption of street car traffic. No damage to property was reported by transportation companies, all portable articles having been moved to places of safety after the warnings were received.

Nothing further of interest was noted in connection with river stages, except in Alabama, where, owing to heavy rains, the Black Warrior River at Tuscaloosa rose 44.6 feet in the three days from the 5th to the 8th, reaching a stage on the latter date of 49.3 feet, 11.3 feet above the danger line. Warnings of a 48-foot stage were issued at 8 a. m. of the 7th, another instance of remarkably accurate forecasting. At Demopolis there was also a rapid rise, the danger line of 35 feet having been reached on the 9th, and a crest of 47.6 feet on the 17th. No damage of consequence resulted from the rise.

Ice was present quite generally north and east of Cairo, and was sufficiently heavy at Cairo on the 1st of the month to impede ferryboat traffic. At Hannibal, Mo., the ice gorge above the Wabash bridge moved out on the 26th.

In the East ice was reported as far south as Lynchburg, where it was 1 inch thick on the 22d.

The rivers of central and eastern Pennsylvania were mostly frozen during the greater portion of the month, and ice 14 inches in thickness was reported at various places.

In the Hudson River 10-inch ice was harvested at Albany on the 4th. On the 6th the ice moved out and gorged south of the city, the river rising as a consequence to 7 inches above the top of the dock.

By noting the southward movement of the line of total freezing and the increasing thickness of the ice in the rivers, the general advance of the winter season can perhaps be more readily observed than in any other manner. The following table, compiled mostly from data taken from the weekly snow and ice charts, shows these conditions as they existed at the end of each week, beginning with December 5, 1898. The thickness of the ice is measured in the rivers and harbors each Monday evening by means of augers and measuring rods especially constructed for the purpose. A long-handled auger bores a hole through the ice, and the measuring rod gives its thickness in inches and tenths of inches, the rod being provided with a bend at its lower end to clamp the ice on the under side, thus insuring an exact measurement.

Thickness of ice in rivers (in inches), winter of 1898–99.

Stations.	December 5.	December 12.	December 19.	December 26.	January 2.	January 9.	January 16.	January 23.	January 30.
St. Paul, Minn	10.0	14.0	16.0	18.0	22.0	23.5	22.5	22.5	24.5
La Crosse, Wis	6.5	*	13.0	14.0	15.0	20.0	22.0	19.0	26.0
Dubuque, Iowa	8.0	10.0	11.0	10.0	14.0	15.0	13.0	10.0	18.0
Davenport, Iowa	.....	1.0	11.0	11.0	12.5	14.0	13.0	12.0	14.0
Keokuk, Iowa	.....	7.0	8.5	10.0	14.0	13.0	12.0	11.0	13.0
Hannibal, Mo	.....	7.0	9.0	6.0	*	11.0	.....	.....	5.0
Williston, N. Dak	12.0	12.0	12.0	12.0	16.0	18.0	20.0	20.0	21.0
Bismarck, N. Dak	10.0	16.0	18.0	18.0	20.0	20.0	24.0	24.0	*
Pierre, S. Dak	11.0	14.0	14.5	15.0	17.0	19.5	19.0	17.5	20.0
Yankton, S. Dak	8.0	11.5	15.5	15.5	16.0	16.0	16.0	16.0	18.5
Sioux City, Iowa	8.5	12.0	12.0	11.0	15.0	16.5	17.5	16.5	18.0
Omaha, Nebr	6.0	8.0	10.0	10.0	*	12.0	*	6.0	10.0
Topeka, Kans	....	2.5	3.0	2.5	4.0	.....	.....	.....	3.5
Kansas City, Mo	....	....	.....	.....	.....	.....	.....	.....	3.0
Columbus, Ohio	.....	8.0	8.0	5.0	0.5	2.5	.....	.....	4.0
Wichita, Kans	.....	3.0	.....	.....	.....	.....	.....	.....	4.0
Moorhead, Minn	13.5	15.0	18.0	20.0	24.0	26.0	26.0	26.0	28.0
Albany, N. Y	.....	.....	5.0	3.0	6.5	1.0	6.0	8.0	10.0

* Missing.

The highest and lowest water, mean stage, and monthly range at 118 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gauges, January, 1899.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,957	14	Frozen	.....	.....	.....	.....	.....
Reads Landing, Minn	1,887	12	0.3	1	—0.5	21–23	0.2	0.8
Red Wing, Minn	.....	.....	.....	.....	.....	.....	.....	.....
La Crosse, Wis	1,822	12	Frozen	.....	.....	.....	.....	.....
North McGregor, Iowa	1,762	18	2.1	19	1.3	31	1.8	0.8
Dubuque, Iowa	1,702	15	Frozen	.....	.....	.....	.....	.....
Leclaire, Iowa	1,612	10	.....	.....	.....	.....	.....	.....
Davenport, Iowa	1,596	15	Frozen	.....	.....	.....	.....	.....
Galland, Iowa	1,475	8	Frozen	.....	.....	.....	.....	.....
Keokuk, Iowa	1,466	14	Frozen	.....	.....	.....	.....	.....
Hannibal, Mo	1,405	17	2.2	4	—1.3	29	0.7	3.5
Grafton, Ill	1,307	23	4.3	16	1.2	31	3.7	3.1
St. Louis, Mo	1,264	30	6.7	1	1.1	31	4.4	5.6
Chester, Ill	1,189	30	4 8	1	0.9	31	2.7	3.9
Cairo, Ill	1,073	45	38.3	19,20	20.0	7	30.9	18.3
Memphis, Tenn	843	33	29.0	22-24	13.3	9	22.4	15.7
Helena, Ark	767	42	38.6	25, 26	20.8	1,8	30.2	17.8
Arkansas City, Ark	635	42	40.6	29,30	21.2	1	31.3	19.4
Greenville, Miss	505	42	34.8	29,30	16.6	1	26.2	18.2
Vicksburg, Miss	474	45	39.6	31	15.2	1	28.9	24.4
New Orleans, La	108	16	14.1	31	4.3	1	9.8	9.8
Arkansas River.								
Wichita, Kans	720	10	1.9	26	1.5	19	1.7	0.4
Fort Smith, Ark	345	22	8.2	16	4.4	31	5.7	3.8
Dardanelle, Ark	250	21	9.5	14,15	4.5	30,31	6.4	5.0
Little Rock, Ark	170	23	14.8	14	6.4	31	9.7	8.4

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
White River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Newport, Ark	150	26	22.7	17	5.7	4	14.8	17.0
Des Moines River.								
Des Moines, Iowa ¶	150	19	2.8	23	2.1	11–13, 16	2.3	0.7
Illinois River.								
Peoria, Ill	135	14	9.3	22, 23	7.5	1	8.6	1.8
Missouri River.								
Bismarck, N. Dak	1,201	14	3.9	12, 13	3.0	17–25	3.4	0.9
Pierre, S. Dak	1,006	14	Frozen	.....	.....	.....	.....	.....
Sioux City, Iowa	676	19	Frozen	.....	.....	.....	.....	.....
Omaha, Nebr	561	18	Frozen	.....	.....	.....	.....	.....
St. Joseph, Mo	373	10	1.3	8	— 0.9	29	0.3	2.2
Kansas City, Mo.	280	21	7.7	4	5.4	20	6.5	2.3
Boonville, Mo	191	20	5.5	5	3.7	3, 29	4.5	1.8
Hermann, Mo.	95	24	6.7	1	3.4	30	4.4	3.3
Ohio River.								
Pittsburg, Pa	966	22	16.5	26	3.3	31	8.8	13.2
Davis Island Dam, Pa	960	25	15.6	8, 16	5.4	31	9.7	10.2
Wheeling, W. Va	875	36	24.3	16	7.6	31	12.9	16.7
Parkersburg, W. Va	785	36	26.6	18	8.9	1	15.4	17.7
Point Pleasant, W. Va	703	39	31.0	18	10.7	2, 3	20.4	20.3
Catlettsburg, Ky	651	50	40.5	8	14.0	1	26.1	26.5
Portsmouth, Ohio	612	50	40.2	9	15.8	3	27.7	24.4
Cincinnati, Ohio	499	50	41.8	15, 16	19.0	4	31.8	22.8
Louisville, Ky	367	28	22.4	16	8.7	4	13.6	13.7
Evansville, Ind	184	35	39.1	18	17.4	15	29.8	21.7
Paducah, Ky	47	40	36.6	18	14.1	6	28.3	22.5
Allegheny River.								
Warren, Pa	177	7	6.3	6	1.2	31	3.4	5.1
Oil City, Pa	123	13	7.2	6	2.0	31	3.8	5.2
Parkers Landing, Pa	73	20	8.5	16	1.6	31	4.2	6.9
Freeport, Pa	26	20	14.2	7	3.5	31	7.6	10.7
Conemaugh River.								
Johnstown, Pa	64	7	4.8	15	2.1	13, 22, 31	2.6	2.7
Red Bank Creek.								
Brookville, Pa	35	8	2.4	15	0.7	24-31	1.1	1.7
Beaver River.								
Ellwood Junction, Pa	10	14	6.9	15	1.2	1-8	2.2	5.7
Cumberland River.								
Burnside, Ky	434	50	52.4	7	5.3	24	14.1	47.1
Carthage, Tenn	257	30	38.6	9	5.2	1	17.4	33.4
Nashville, Tenn	175	40	39.9	14	7.4	1	22.3	32.5
Great Kanawha River.								
Charleston, W. Va	61	30	24.7	7	4.6	2	8.2	20.1
New River.								
Hinton, W. Va	95	14	6.6	7	2.5	4	3.4	4.1
Licking River.								
Falmouth, Ky	30	25	21.8	14	4.0	1, 2, 23	8.8	17.8
Miami River.								
Dayton, Ohio	69	18	10.5	15	2.3	3	3.8	8.2
Monongahela River.								
Weston, W. Va	161	18	10.0	6	0.0	22–24, 30, 31	1.7	10.0
Fairmont, W. Va	119	25	20.3	7	1.6	2, 3	4.9	18.7
Greensboro, Pa.	81	18	22.0	7	8.0	1, 3	10.5	14.0
Lock No. 4, Pa	40	28	23.5	7	7.8	3	12.1	15.7
Cheat River.								
Rowlesburg, W. Va.	36	14	7.0	7	3.0	3, 4, 22–24	4.2	4.0
Youghiogheny River.								
Confluence, Pa	59	10	8.5	15	1.6	3	4.1	6.9
West Newton, Pa.	15	23	10.0	15	1.5	1	3.6	8.5
Muskingum River.								
Zanesville, Ohio.	70	20	20.0	16	6.8	31	11.9	13.2
Tennessee River.								
Kingston, Tenn	534	25	12.9	7	1.3	31	4.6	11.6
Chattanooga, Tenn	430	33	18.8	8, 9	4.7	1	8.1	14.1
Bridgeport, Ala	390	24	15.0	9	2.7	1, 2	6.3	12.3
Florence, Ala	220	16	14.2	9	2.9	4	7.2	11.3
Johnsonville, Tenn	94	21	23.9	14	5.1	4	13.3	18.8
Clinch River.								
Speers Ferry, Va	156	20	8.7	7	0.4	30, 31	1.9	8.3
Clinton, Tenn	46	25	21.5	8	5.6	31	9.4	15.9
Wabash River.								
Mount Carmel, Ill.	50	15	19.5	23	5.4	2	12.3	14.1
Red River.								
Arthur City, Tex	688	27	.....	.....	.....	.....	.....	.....
Fulton, Ark	565	28	22.7	17	4.5	5	12.0	18.2
Shreveport, La	449	29	15.7	25	3.6	8	10.2	12.1
Alexandria, La	139	33	18.2	27	6.0	5	13.3	12.2
Atchafalaya Bayou.								
Melville, La	100*	31	31.0	31	16.7	1	26.3	14.3
Ouachita River.								
Camden, Ark	340	39	39.1	18	5.9	4	21.3	33.2
Monroe, La	100	40	31.3	31	8.4	4	21.2	22.9
Yazoo River.								
Yazoo City, Miss	80	25	19.8	31	3.5	4	15.0	15.3
Albany, Ga	80	20	18.8	18	6.4	3, 4	11.8	12.4
Cape Fear River.								
Fayetteville, N. C.	100	38	23.6	16	4.5	1	9.9	19.1
Columbia River.								
Umatilla, Oreg	270	25	5.3	23	— 0.5	5	1.5	5.8
The Dalles, Oreg	166	40	7.1	30	1.1	9, 10	3.9	6.0
Willamette River.								
Albany, Oreg	99	20	16.6	22	6.0	31	9.8	10.6
Portland, Oreg	10	15	14.1	22	2.8	7, 8	7.7	11.3
Edisto River.								
Edisto, S. C	75	6	5.5	19–21	3.7	9, 10	4.6	1.8
James River.								
Lynchburg, Va	257	18	8.6	7	1.2	5	2.6	7.4
Richmond, Va	110	12	13.5	8	0.9	1, 4, 29, 30	2.4	12.6
Alabama River.								
Montgomery, Ala	265	35	18.0	13	5.0	1, 4	9.5	13.0
Selma, Ala	212	35	21.9	14	5.8	6	11.6	16.1

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Coosa River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Rome, Ga	225	30	5.9	8,9	2.6	5,6	3.7	3.3
Gadsden, Ala	144	18	6.5	10,11	2.7	1,2	4.5	3.8
Tombigbee River.								
Columbus, Miss.	285	33	21.8	11	0.1	2	8.8	21.7
Demopolis, Ala	155	35	47.6	17	3.9	2	31.5	43.7
Black Warrior River.								
Tuscaloosa, Ala	90	38	49.3	8	4.4	1	20.8	44.9
Pedee River.								
Cheraw, S. C.	145	27	27.8	9	2.0	2	9.2	25.8
Black River.								
Kingstree, S. C	60	12	9.9	24,25	6.9	13,14	8.4	3.0
Lumber River.								
Fairbluff, N. C.	10	6	5.7	22	3.2	11	4.5	2.5
Lynch Creek.								
Effingham, S. C.	35	12	12.4	22	4.3	11	8.1	8.1
Potomac River.								
Harpers Ferry, W. Va.	170	16	6.8	7	3.0	31	4.7	3.8
Roanoke River.								
Clarksville, Va.	155	12	13.7	9	1.5	31	3.8	12.2
Sacramento River.								
Red Bluff, Cal.	241	23	13.5	16	0.4	1,5	4.6	13.1
Sacramento, Cal.	70	25	16.6	22	8.2	1	13.2	8.4

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Santee River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Stephens, S. C.	50	12	9.3	21-23	6.4	9	8.0	2.9
Congaree River.								
Columbia, S. C.	37	15	8.5	8	0.6	1,6	2.6	7.9
Wateree River.								
Camden, S. C.	45	24	23.8	8	5.5	2	10.8	18.3
Savannah River.								
Augusta, Ga.	130	32	22.9	8	8.5	6	12.7	14.4
Susquehanna River.								
Wilkesbarre, Pa.	178	14	21.0	7	4.5	1,2	11.7	16.5
Harrisburg, Pa.	70	17	8.0	7	2.9	3	4.4	5.1
Juniata River.								
Huntingdon, Pa.	80	24	5.5	25	4.0	1-4	4.7	1.5
W. Br. of Susquehanna.								
Williamsport, Pa.	35	20	8.0	7	3.0	31	4.5	5.0
Waccamaw River.								
Conway, S. C.	40	7	5.3	31	2.3	10	3.6	3.0

* Distance to Gulf of Mexico. † Record for 25 days. ‡ Record for 26 days.
§ Record for 27 days. ‖ Record for 30 days. ¶ Record for 23 days.

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

General remarks.—The weather of January, 1899, was fairly typical of midwinter conditions. The atmospheric circulation was vigorous, and the alternations from fair to stormy weather were sharp and more decided than during the preceding month.

The distinguishing characteristics of the month were perhaps the distribution and frequency of highs and lows, as shown in detail in the preceding section, and the sharp fall in mean pressure over the Rocky Mountain and Plateau regions.

From the 26th to the end of the month there was a succession of cold waves with high winds and snow throughout the Rocky Mountain region and a portion of the plains eastward to the Mississippi Valley. As the month closed a cold wave was moving southward and eastward to the line of zero temperature, extending from northwestern Texas to central Ohio.

While the stormy conditions above mentioned were prevailing in the Rocky Mountain region, midsummer weather was being experienced in California. Temperatures at midday, ranging from 70° to 80°, were observed in the Great Valley and southern California. At San Francisco a maximum temperature of 78° was registered on the 26th, the highest January maximum recorded during the past twenty-seven years.

PRESSURE AND WIND.

The character of the weather on the Pacific coast is largely determined by the pressure distribution, both in that region and farther to the eastward. During the preceding month pressure was unusually high over the Plateau region, and the course of the north Pacific lows was so far to the northeastward that scarcely any rain fell in California where droughty conditions had prevailed since October. Fortunately for the great agricultural and commercial interests of that State, this condition of affairs came to an end on January 1, 1899, when a vigorous north Pacific low caused general rains throughout the State. The snow covering on the mountains, hitherto scanty indeed, was considerably increased, and the outlook of previous weeks was much improved. Other lows approached from the west, and the rains came in generous proportions until the 20th, after which date substantially no rain fell in California and but little elsewhere on the Pacific coast. The weather on the coast during this period was dominated by a succession of highs that apparently moved inland from the Pacific. The lows, on the other hand, to whose influence precipitation on the coast is due, had their origin in Alberta, moving thence southeastward, but at such a distance as to exert no influence upon the weather of the coast.

East of the Rocky Mountains there was the usual alternation from warm and pleasant, to cold and stormy, weather.

The number of lows that originated in Texas and on the Gulf coast was greater than usual, and as a result there was generous rainfall in the Gulf States, Florida, the middle Mississippi Valley, and the Ohio Valley and Tennessee. In the first-named States farm work was much retarded by reason of the excess of rain.

TEMPERATURE OF THE AIR.

The departures of temperature were not very marked in any section. The greatest positive departures were observed throughout an irregular area extending from Kansas City to the headwaters of the Missouri River, thence westerly and southwesterly to include northern Wyoming, Utah, and Nevada, eastern Oregon and Washington, and practically all of Idaho. The negative departures were generally small. No especially severe cold waves occurred. Cold weather and snow were experienced on the Atlantic seaboard on the 1st. The next general period of cold weather fell on the 5th, 6th, and 7th, and zero temperatures were registered in New England and eastern New York on the 8th and 9th. A moderate cold wave moved from the northwest to New England by way of the Lake region on the 17th, 18th, and 19th, and, as stated under "general remarks," a succession of cold waves with snow and zero temperatures moved southward over the Rocky Mountain and Plains regions from the 26th to the close of the month.

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by black and the latter by dotted lines.

As will be noticed, these lines have been drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	27.3	+ 0.5		
Middle Atlantic	12	32.5	0.0		
South Atlantic	10	46.8	+ 0.2		
Florida Peninsula	7	61.6	+ 1.3		
East Gulf	7	49.1	− 0.8		
West Gulf	7	47.2	+ 0.6		
Ohio Valley and Tennessee	12	34.6	+ 0.4		
Lower Lake	8	25.5	+ 0.2		
Upper Lake	9	17.1	− 0.5		
North Dakota	7	5.0	+ 3.8		
Upper Mississippi	11	24.0	+ 2.9		
Missouri Valley	10	25.2	+ 5.0		
Northern Slope	7	21.2	+ 4.2		
Middle Slope	6	31.0	+ 3.0		
Southern Slope	6	37.0	+ 0.6		
Southern Plateau	9	40.0	− 0.4		
Middle Plateau	13	29.6	+ 4.5		
Northern Plateau	10	29.5	+ 4.8		
North Pacific	9	41.0	+ 1.9		
Middle Pacific	5	49.9	+ 2.8		
South Pacific	4	53.9	+ 3.3		

In Canada.—Prof. R. F. Stupart says:

Temperature conditions were in several respects rather remarkable, especially so in the Ottawa Valley and the Lake region, where the change from minus to plus, or vice versa, was very sharply defined. This was very noticeable between Rockliffe and Ottawa, the former place giving 3° below average and the latter 3° above; and again Welland was 3° above and Stratford 2° below average. From British Columbia to Keewatin Territory temperature was everywhere above average, the excess being as much as 6° in northern Alberta. From the eastern portion of Ontario to our Atlantic coast, except in Cape Breton, it was also in all localities above average, but at the majority of places the amount did not exceed 1°.

PRECIPITATION.

Although precipitation was below normal in the majority of districts the minus departures were generally small and without special significance. On the whole, the precipitation was apparently sufficient for all needs.

The numerical values of total precipitation and total depth of snowfall are given in Tables I and II, and the geographic distribution is graphically shown on Charts III and VIII. The depth of snow on the ground is also shown on Chart IX.

In Canada.—Professor Stupart says:

In the Lake Superior district, the Ottawa and St. Lawrence valleys, and also over the greater portion of the Maritime Provinces, precipitation was below average, except very locally, where it was somewhat exceeded. The greatest general deficiency occurred in the Province of Quebec, Quebec itself being 1.7 inch below average, and Father Point 2.0 inches below. In the Northwest Territories and Manitoba it was on the other hand, as a rule, above average, and only very locally below, the greatest amounts above average being 0.9 inch at Winnipeg and Prince Albert, respectively. In British Columbia, Victoria, was 0.7 inch below average, but lower mainland stations report a heavy precipitation. The most noticeable feature of the January precipitation was the phenomenally heavy snowfall in the Georgian Bay region, where at the close of the month the amount of snow reported on the ground was at Parry Sound, 56 inches; Sprucedale, 48 inches; Beatrice, 37 inches; Haliburton, 21 inches; Collingwood, 36 inches; Owen Sound, 27 inches; Bognor, 24 inches. On the other hand in the lower Lake region there was little or no snow on the ground at the end of the month.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	3.85	97	−0.1	
Middle Atlantic	12	3.24	89	−0.4	
South Atlantic	10	4.06	95	−0.2	
Florida Peninsula	7	4.67	163	+1.8	
East Gulf	7	5.36	104	+0.2	
West Gulf	7	4.58	132	+1.1	
Ohio Valley and Tennessee	12	4.30	102	+0.1	
Lower Lake	8	2.37	89	−0.3	
Upper Lake	9	1.23	61	−0.8	
North Dakota	7	0.49	71	−0.2	
Upper Mississippi	11	1.16	66	−0.6	
Missouri Valley	10	0.45	43	−0.6	
Northern Slope	7	0.78	115	+0.1	
Middle Slope	6	0.39	44	−0.5	
Southern Slope	6	0.38	35	−0.7	
Southern Plateau	9	0.65	76	−0.2	
Middle Plateau	13	1.13	79	−0.3	
Northern Plateau	10	2.27	105	+0.1	
North Pacific	9	11.33	136	+3.0	
Middle Pacific	5	6.10	109	+0.5	
South Pacific	4	3.12	115	+0.4	

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 11, 12. Arkansas, 13. California, 2, 4, 10, 11, 17, 18. Louisiana, 3, 14. New Jersey, 24. New York, 24. Oklahoma, 14. Oregon, 1, 2, 3, 11, 13, 14, 31. Texas, 5. Utah, 16. Washington, 11.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 18, 21, 28. Arkansas, 4, 5, 23, 30. California, 1, 3, 9, 10. Colorado, 8, 22, 25, 26. Connecticut, 6, 9, 13, 14, 24. Delaware, 1, 13. District of Columbia, 12. Georgia, 11, 19, 27. Idaho, 3, 6, 7. Illinois, 4, 9, 12, 17, 19, 20, 23, 24, 26, 30. Indiana, 11, 12, 23, 24, 26. Indian Territory, 23. Iowa, 4, 9, 10, 12, 13, 21, 22, 23. Kansas, 11, 23, 25, 28. Kentucky, 3, 5, 6, 10, 11, 12, 17, 20, 22, 23, 24. Louisiana, 3, 4, 8, 9, 10, 13, 14, 15, 27, 28, 30, 31. Maine, 4, 6, 7, 14, 15, 24, 25. Maryland, 5, 6, 7, 12, 13, 15, 31. Massachusetts, 4, 6, 7, 13, 14, 25, 26. Michigan, 4, 5, 10, 12, 13, 14, 23. Minnesota, 11, 12, 19, 22, 23, 25. Mississippi, 6, 24, 25, 27, 30, 31. Missouri, 3, 4, 5, 6, 8, 9, 10, 19, 23, 30. Montana, 12, 15, 16, 17, 18, 24, 25, 28. Nebraska, 10, 11, 25, 26. New Hampshire, 6, 7, 13, 14, 24, 25. New Jersey, 1, 6, 7, 12, 13, 14, 24, 30. New Mexico, 3, 12. New York, 4, 6, 13, 14, 15, 21, 24, 26. North Carolina, 1, 3, 9, 10, 11, 12, 13, 16, 21, 24, 28. North Dakota, 12. Ohio, 6, 12, 14, 24, 26, 31. Oklahoma, 27. Oregon, 2, 5, 6, 7, 9, 10, 13, 15, 21, 31. Pennsylvania, 1, 6, 7, 13, 14, 22, 23, 24. Rhode Island, 7. South Carolina, 11, 12, 18, 19, 23, 28. South Dakota, 12, 20, 22, 23, 25. Tennessee, 3, 6, 18, 24, 30, 31. Texas, 23, 28. Utah, 15, 16. Vermont, 6, 13, 14, 24, 25. Virginia, 1, 6, 11, 12, 13, 30, 31. Washington, 9, 10, 13, 18, 21, 31. West Virginia, 4, 6, 11, 12, 13, 16, 24. Wisconsin, 12, 26. Wyoming, 10, 15, 24, 25, 26.

WIND.

High winds, local storms, and tornadoes.—A rather large number of high winds was reported during the month, as may be seen by an examination of the table below. Many of the high velocities reported in the table, such, for example, as those recorded at Mount Tamalpais and Fort Canby, are due to the fact that the anemometers at those stations are exceptionally well exposed to the full sweep of the winds from every quarter.

7th.—A tornado was reported as having passed over a portion of Liberty County, Georgia, the most damage being done at Johnston, between Savannah and Waycross. No lives lost; other details lacking.

13th.—A tornado was observed about 4 miles northwest of Kilgore, Tex., moving in a northeasterly direction. One tenement house destroyed, and the inmates, six persons, badly injured.

14th.—Very high, and in some cases, destructive storm winds were experienced in Ohio and western Pennsylvania on this date.

23d.—A severe local windstorm visited Greenville, S. C., about 4 p. m. of this date. Roofs were torn off, smokestacks and chimneys demolished, and trees blown down. No fatalities.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	22	52	n.	Fort Canby, Wash.	31	52	se.
Do.	23	72	n.	Hatteras, N. C	1	52	nw.
Bismarck, N. Dak.	25	52	nw.	Do.	16	52	s.
Buffalo, N. Y.	4	64	w.	Do.	28	58	n.
Do.	5	58	sw.	Lexington, Ky	14	55	w.
Do.	6	54	w.	Mount Tamalpais, Cal.	1	55	se.
Do.	7	71	w.	Do.	2	51	w.
Do.	14	66	w.	Do.	10	86	w.
Do.	21	53	w.	Do.	24	60	n.
Do.	26	72	w.	Do.	25	57	ne.
Do.	27	60	w.	Do.	26	50	ne.
Do.	30	54	w.	Do.	31	65	nw.
Cairo, Ill	4	54	w.	New York, N. Y.	7	54	n.
Carson City, Nev.	1	60	sw.	Do.	24	52	nw.
Do.	31	50	sw.	Do.	25	66	nw.
Cheyenne, Wyo.	4	60	w.	Do.	27	65	n.
Chicago, Ill	26	52	w.	Pierre, S. Dak	22	51	n.
Cleveland, Ohio	14	58	sw.	Do.	25	59	nw.
Do.	26	50	w.	Point Reyes Light, Cal.	10	75	se.
Denver, Col	22	50	ne.	Do.	11	50	se.
El Paso, Tex	30	51	nw.	Do.	31	56	nw.
Fort Canby, Wash.	1	52	se.	Port Huron, Mich.	26	50	sw.
Do.	9	69	s.	Sioux City, Iowa	25	56	nw.
Do.	13	72	s.	Do.	26	56	nw.
Do.	14	70	s.	Williston, N. Dak.	25	60	n.
Do.	15	60	s.	Winnemucca, Nev.	31	72	sw.
Do.	17	54	se.	Woods Hole, Mass.	15	52	sw.
Do.	19	63	se.	Do.	25	51	s.
Do.	20	50	s.				

SUNSHINE AND CLOUDINESS.

There was very little sunshine and, conversely, very great cloudiness on the north Pacific coast, the northern Plateau, and the upper portion of the middle Plateau. The very great cloudiness in the Plateau region is rather remarkable, considering the high pressure that prevailed there.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.3	−0.5	Missouri Valley	4.8	−0.3
Middle Atlantic	5.5	−0.1	Northern Slope	5.7	+1.1
South Atlantic	6.0	+0.7	Middle Slope	4.6	+0.8
Florida Peninsula	5.7	−1.0	Southern Slope	4.0	+0.2
East Gulf	6.3	+0.7	Southern Plateau	2.2	−0.7
West Gulf	5.6	+0.2	Middle Plateau	6.4	−1.6
Ohio Valley and Tennessee.	6.4	0.0	Northern Plateau	8.2	+0.9
Lower Lake	7.1	−0.4	North Pacific Coast	8.7	+1.6
Upper Lake	6.2	−0.6	Middle Pacific Coast	6.3	+1.2
North Dakota	4.9	+0.2	South Pacific Coast	4.0	−0.1
Upper Mississippi Valley	5.2	−0.1			

HUMIDITY.

The relative humidity of the air continued relatively low in the middle and south Pacific coast districts as well as throughout the Plateau region, although precipitation and cloudiness were both above normal in the first named.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	74	− 2	Missouri Valley	70	− 8
Middle Atlantic	75	0	Northern Slope	67	− 3
South Atlantic	80	+ 2	Middle Slope	67	0
Florida Peninsula	84	+ 2	Southern Slope	66	+ 2
East Gulf	78	0	Southern Plateau	47	+ 4
West Gulf	76	+ 1	Middle Plateau	68	+ 1
Ohio Valley and Tennessee.	77	0	Northern Plateau	79	+ 2
Lower Lake	75	− 6	North Pacific Coast	89	+ 2
Upper Lake	84	+ 2	Middle Pacific Coast	76	+ 5
North Dakota	75	− 6	South Pacific Coast	68	− 6
Upper Mississippi Valley	76	− 2			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Four hundred and twenty-six reports of thunderstorms were received during the current month as against 887 in 1898 and 148 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 24th, 122; 13th, 60; 14th, 50; 4th, 39. The periods of greatest frequency were: 4–6th, 12–14th, 23d–25th.

Reports were most numerous from: Ohio, 46; Arkansas, 44; New Jersey, 35; Texas, 28; Mississippi, 26; Kentucky and Maryland, 23.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be four, preceding and following the date of full moon, viz, from the 22d to the 30th.

The greatest number of reports were received for the following dates: 28th, 35; 29th, 6.

Reports were most numerous from: Minnesota and North Dakota, 12; Michigan, 9; Illinois and South Dakota, 6.

In Canada.—Auroras were reported as follows: Father Point, 11th; Quebec, 17th, 29th; Minnedosa, 16th, 17th, 18th, 20th, 24th, 29th; Prince Albert, 15th; Battleford, 24th.

No thunderstorms were reported.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 44.6°, or nearly normal; the highest was 75°, at Mount Willing on the 10th, and the lowest, 10°, at Newburg on the 1st and at Madison on the 31st. The average precipitation was 5.64, or 0.40 above normal; the greatest monthly amount, 9.97, occurred at Newton, and the least, 1.66, at Livingston.—*F. P. Chaffee.*

Arizona.—The mean temperature was 43.5°, or 0.6° below normal; the highest was 88°, at Maricopa on the 24th and at Signal on the 28th, and the lowest, 12° below zero, at Fort Defiance on the 1st. The average precipitation was 1.01, or 0.03 above normal; the greatest monthly amount, 2.35, occurred at Oracle, and the least, 0.02, at Blaisdell.—*W. G. Burns.*

Arkansas.—The mean temperature was 39.3°, or 0.5° above normal; the highest was 75°, at Blanchard on the 13th, and the lowest, 9° below zero, at Corning on the 31st. The average precipitation was 5.91, or 1.48 above normal; the greatest monthly amount, 11.19, occurred at Lonoke, and the least, 1.58, at Winslow.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 246 stations, so that equal areas have about equal weight, was 46.4°, or 2.4° above normal; the highest was 91°, at Hill Ranch, San Luis Obispo County, on the 29th, and the lowest, 17° below zero, at Bodie, Mono County, on the 13th. The average precipitation was 3.53, or 0.50 above normal; the greatest monthly amount, 20.83, occurred at Fort Ross, Sonoma County, while none fell at Volcano Springs, San Diego County.—*W. H. Hammon.*

Colorado.—The mean temperature was 22.7°, or 1.9° below normal; the highest was 63°, at Leroy on the 3d, and the lowest, 36° below zero, at Gunnison on the 14th. The average precipitation was 0.78, or 0.17 below normal; the greatest monthly amount, 5.19, occurred at Ruby, and the least, trace, at Garnett.—*F. H. Brandenburg.*

Florida.—The mean temperature was 59.2°, or nearly normal; the highest was 88°, at Bartow on the 6th, at Manatee on the 15th, and at Boca Raton on the 16th; the lowest was 25°, at Defuniak Springs on the 29th. The average precipitation was 4.53, or 1.50 above normal; the greatest monthly amount, 8.71, occurred at Earnestville, and the least, 1.00, at Carrabelle.—*A. J. Mitchell.*

Georgia.—The mean temperature was 45.4°, or 0.4° above normal; the highest was 79°, at Jessup on the 6th, and the lowest, 15°, at Diamond on the 1st, 2d, 7th, and 8th, at Ramsey on the 2d, and at Tallapoosa on the 31st. The average precipitation was 4.96, or 0.37 above normal; the greatest monthly amount, 8.06, occurred at Covington, and the least, 3.20, at Piscola.—*J. B. Marbury.*

Illinois.—The mean temperature was 26.3°, or about 1.0° above normal; the highest was 64°, at Cairo on the 4th, and the lowest, 21° below zero, at Lanark on the 29th and 31st and at Scales Mound on the 31st. The average precipitation was 1.86, or 0.65 below normal; the greatest monthly amount, 7.78, occurred at Raum, and the least, 0.24, at Galva and Savanna.—*C. E. Linney.*

Indiana.—The mean temperature was 28.6°, or 1.9° above normal; the highest was 65°, at Washington on the 23d, and the lowest, 14° below zero, at Lafayette on the 29th and at Valparaiso on the 29th and 31st. The average precipitation was 3.23, or 0.16 above normal; the greatest monthly amount, 5.17, occurred at Marengo, and the least, 0.50, at Valparaiso.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 19.8°, or several degrees above normal; the highest was 68°, at Council Bluffs on the 21st, and the lowest, 34° below zero, at Mason City on the 31st. The average precipitation was 0.28, or much below normal; the greatest monthly amount, 1.15, occurred at Eldora, and the least, trace, at several stations—*G. M. Chappel.*

Kansas.—The mean temperature was 30.1°, or 1.4° below normal; the highest was 66°, at Cunningham and Fall River on the 21st, and at Englewood and Grenola on the 22d, and the lowest, 18° below zero, at Colby and Russell on the 31st. The average precipitation was 0.35, or 0.50 below normal; the greatest monthly amount, 1.20, occurred at Pittsburg, while none fell at Lebanon.—*T. B. Jennings.*

Kentucky.—The mean temperature was 34.4°, or nearly normal; the highest was 68°, at Marrowbone on the 4th, and the lowest, 18° below zero, at Loretto on the 31st. The average precipitation was 6.23, or 1.95 above normal; the greatest monthly amount, 8.22, occurred at Hopkinsville, and the least, 3.30, at Carrollton.—*H. B. Hersey.*

Louisiana.—The mean temperature was 49.9°, or 1.1° below normal; the highest was 82°, at Donaldsonville on the 4th and at Schriever on the 13th, and the lowest, 11°, at White Sulphur Springs on the 2d. The average precipitation was 6.43, or 1.59 above normal; the greatest monthly amount, 14.01, occurred at Jennings, and the least, 1.00, at Houma and Lawrence.—*A. G. McAdie.*

Maryland and Delaware.—The mean temperature was 32.9°, or 1.3° above normal; the highest was 70°, at Ocean City, Md., on the 15th, and the lowest, 24° below zero, at Sunnyside, Md., on the 2d. The average precipitation was 3.30, or 0.62 above normal; the greatest monthly amount, 6.59, occurred at Sunnyside, Md., and the least, 1.31, at Boettcherville, Md.—*F. J. Walz.*

Michigan.—The mean temperature was 19.1°, or 1.3° below normal; the highest was 56°, at Allegan on the 4th, and the lowest, 41° below zero, at Iron River on the 31st. The average precipitation was 1.79, or 0.57 below normal; the greatest monthly amount, 3.31, occurred at Thornville, and the least, 0.35, at Rogers City.—*C. F. Schneider.*

Minnesota.—The mean temperature was 9.9°, or about 1.0° above normal; the highest was 49°, at Pleasant Mounds on the 15th, and the lowest, 54° below zero, at Pokegama on the 29th. The average precipitation was 0.60, or about normal; the greatest monthly amount, 1.48, occurred at Glenwood, and the least, trace, at several stations.—*T. S. Outram.*

Mississippi.—The mean temperature was 45.2°, or nearly normal; the highest was 79°, at Natchez on the 4th, and the lowest, 1°, at Ripley on the 31st. The average precipitation was 7.77, or nearly 3.0 above normal; the greatest monthly amount, 13.25, occurred at Canton, and the least, 3.90, at Pearlington.—*W. T. Blythe.*

Missouri.—The mean temperature was 30.3°, or 1.3° above normal; the highest was 70°, at Mount Vernon on the 22d, and the lowest, 21° below zero, at Pickering on the 29th. The average precipitation was 1.54, or 0.82 below normal; the greatest monthly amount, 12.61, occurred at New Madrid, and the least, 0.01, at Elmira.—*A. E. Hackett.*

Montana.—The mean temperature was 20.9°, or 1.1° above normal; the highest was 60°, at Parrot on the 18th, and the lowest, 45° below zero, at Fort Logan on the 4th. The average precipitation was 1.35, or 0.43 above normal; the greatest monthly amount, 3.60, occurred at Troy.—*E. J. Glass.*

Nebraska.—The mean temperature was 23.0°, or 3.1° above normal; the highest was 74°, at Fort Robinson on the 20th, and the lowest, 21° below zero, at Norfolk, Hartington, and Santee Agency on the 30th, and at Springfield on the 31st. The average precipitation was 0.24, or about 0.40 below normal; the greatest monthly amount, 1.50, occurred at Lodgepole, while none fell at several central and southwestern stations.—*G. A. Loveland.*

Nevada.—The mean temperature was 31.8°, or about 5.0° above normal; the highest was 65°, at Las Vegas on the 28th, and the lowest, 12° below zero, at Monitor Mill on the 13th. The average precipitation was 1.20, or about 1.15 below normal; the greatest monthly amount, 4.36, occurred at Verdi, and the least, trace, at Battle Mountain.—*J. H. Smith.*

New England.—The mean temperature was 22.3°, or 0.6° above normal; the highest was 59°, at Bennington, Vt., on the 5th, and the lowest, 32° below zero, at Fairfield, Me., on the 2d. The average precipitation was 3.59, or 0.29 below normal; the greatest monthly amount, 6.04, occurred at Narragansett Pier, R. I., and the least, 1.12, at Burlington, Vt.—*J. W. Smith.*

New Jersey.—The mean temperature was 30.1°, or 0.3° above normal; the highest was 60°, at Moorestown on the 5th, and the lowest, 21° below zero, at Rivervale on the 2d. The average precipitation was 4.01, or 0.21 above normal; the greatest monthly amount, 5.73, occurred at Rivervale, and the least, 2.40, at Atlantic City.—*E. W. McGann.*

New Mexico.—The mean temperature was 31.7°, or 1.4° below normal; the highest was 73°, at Eddy on the 22d, and the lowest, 21° below zero, at Buckmans on the 14th. The average precipitation was 0.34, or 0.24 below normal; the greatest monthly amount, 2.80, occurred at Fort Wingate, while none fell at Eddy, Galisteo, Hillsboro, and San Marcial.—*R. M. Hardinge.*

New York.—The mean temperature was 23.0°, or 0.1° below normal; the highest was 62°, at Bolivar on the 5th, and the lowest, 35° below zero, at Saranac Lake on the 10th. The average precipitation was 2.42, or 0.50 below normal; the greatest monthly amount, 5.90, occurred at Kings Station, and the least, 0.40, at Fleming.—*R. G. Allen.*

North Carolina.—The mean temperature was 40.5°, or nearly normal; the highest was 77°, at Tarboro on the 6th, and the lowest, 5°, at Roxboro on the 2d. The average precipitation was 4.00, or slightly below normal; the greatest monthly amount, 7.44, occurred at Oakridge, and the least, 1.98, at Biltmore.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 6.2°, or 3.0° above normal; the highest was 55°, at Berthold Agency on the 22d, and the lowest, 41°

below zero, at Hamilton on the 30th. The average precipitation was 0.29, or 0.30 below normal; the greatest monthly amount, 0.78, occurred at Forman, and the least, trace, at Ashley, Coal Harbor, Ellendale, Glenullin, Larimore, and Steele.—*B. H. Bronson.*

Ohio.—The mean temperature was 27.8°, or nearly normal; the highest was 66°, at Portsmouth on the 4th, and the lowest, 15° below zero, at Colebrook and Garrettsville on the 31st. The average precipitation was 3.01, or nearly normal; the greatest monthly amount, 6.53, occurred at Hanging Rock, and the least, 1.44, at Annapolis.—*J. Warren Smith.*

Oregon.—The mean temperature was 38.6°, or 3.6° above normal; the highest was 78°, at Langlois on the 25th, and the lowest, 10° below zero, at Weston on the 3d. The average precipitation was 6.49, or 0.37 above normal; the greatest monthly amount, 30.08, occurred at Glenora, and the least, 0.23, at Prineville.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 26.6°, or 1.4° below normal; the highest was 66°, at Pittsburg on the 4th, and at Lycippus on the 5th, and the lowest, 21° below zero, at Dushore on the 2d. The average precipitation was 3.05, or 0.15 below normal; the greatest monthly amount, 4.84, occurred at Browers Lock, and the least, 0.82, at Franklin.—*T. F. Townsend.*

South Carolina.—The mean temperature was 44.4°, or 1.6° below normal; the highest was 78°, at Gillisonville on the 6th, and the lowest, 17°, at Little Mountain on the 2d and at Walhalla on the 7th. The average precipitation was 4.72, or 0.37 above normal; the greatest monthly amount, 6.75, occurred at Holland, and the least, 2.84 at Charleston.—*J. W. Bauer.*

South Dakota.—The mean temperature was 15.0°, or about 4.0° above normal; the highest was 68°, at Desmet on the 24th, and the lowest, 32° below zero, at Wessington Springs on the 30th. The average precipitation was 0.40, or 0.28 below normal; the greatest monthly amount, 2.65, occurred at Rochford, and the least, trace, at Forestburg, Gannvalley, and Wessington Springs.—*S. W. Glenn.*

Tennessee.—The mean temperature was 38.3°, or slightly above normal; the highest was 72°, at Jackson on the 4th, and the lowest, 2° below zero, at Madison on the 31st. The average precipitation was 6.02, or nearly 1.00 above normal; the greatest monthly amount, 8.75, occurred at Union City, and the least, 2.06, at Silverlake.—*H. C. Bate.*

Texas.—The mean temperature for the State, determined by comparison of 41 stations, well distributed throughout the State, was 1.8° below the normal; the temperature was nearly normal along the coast, while there was a general deficiency over the interior; maximum, 91° at Fort Ringgold on the 21st; minimum, 3° below zero at Amarillo on the 31st. The average precipitation for the State, determined by comparison of 51 stations, distributed throughout the State, was 0.32 below the normal; there was a deficiency ranging from 1.00 to 2.38 over central Texas, the eastern portion of southwest Texas and the extreme western portion of the coast district, while there was an excess generally elsewhere, which, however, was light except along the east coast, where the excess ranged from 1.83 to 6.70, the greatest being at Galveston. The rainfall at Galveston, 10.39, is the heaviest on record for the month of January since the opening of the station in 1871. The weather was generally favorable for wheat. Too much rain over the east coast injured strawberry plants and retarded garden work.—*I. M. Cline.*

Utah.—The mean temperature was 27.7°; the highest was 70°, at St. George on the 27th, and the lowest, 21° below zero, at Woodruff on the 10th. The average precipitation was 1.14; the greatest monthly amount, 3.96, occurred at Huntsville, and the least, 0.10, at Frisco and Grove.—*L. H. Murdoch.*

Virginia.—The mean temperature was 35.5°, or 1.4° below normal; the highest was 75°, at Sunbeam on the 6th, and the lowest, 12° below zero, at Woodstock on the 2d. The average precipitation was 3.36, or 1.02 below normal; the greatest monthly amount, 5.34, occurred at Warrenton, and the least, 1.31, at Stephens City.—*E. A. Evans.*

Washington.—The mean temperature was 34.4°, or nearly normal; the highest was 66°, at Waterville on the 27th, and the lowest, 36° below zero, at Usk on the 6th. The average precipitation was 7.36, or about 2.00 above normal; the greatest monthly amount, 24.28, occurred at Clearwater, and the least, 1.29, at Loomis.—*G. N. Salisbury.*

Wisconsin.—The mean temperature was 13.9°, or nearly normal; the highest was 52°, at Prairie du Chien on the 26th, and the lowest, 46° below zero, at Osceola on the 29th. The average precipitation was 0.86, or 0.23 below normal; the greatest monthly amount, 1.70, occurred at Shawano, and the least, 0.15, at Brodhead —*W. M. Wilson.*

Wyoming.—The mean temperature was 22.7°, or slightly above normal; the highest was 60°, at Hecla on the 10th and at Sundance on the 13th and 18th, and the lowest was 21° below zero, at Sheridan on the 5th. The average precipitation was 1.50, or about 0.75 above normal; the greatest monthly amount, 6.40, occurred at Sherman, and the least, 0.10, at Wamsutter.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

LIST OF RECENT TITLES OF PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Naturwissenschaftliche Rundschau, Braunschweig, 14 *Jahrgang.*

Trabert, Wilh. Der Zusammenhang zwischen den Erscheinungen des Erdmagnetismus und den elektrischen Vorgängen in der Atmosphäre, p. 41. [From Metl. Zeit.]

Comptes Rendus, Paris, Tome 128.

Berthelot. Sur la marche générale de la végétation; plante développée à l'ombre et au soleil; regain. p. 139.

Poincare, M. A. Movements barométriques sur l'orthogonal du méridien de la Lune. p. 328.

Tillo, A. de. Résultats des observations météorologiques faites dans la dépression au centre du continent asiatique, (station Lukishoun). p. 154.

Voielland, M. Chute de grële et trombe observées à Bizerte. p. 327.

Nature, London, Vol. 59.

MacMahon, P. A. Mirage. p. 259.

Das Wetter, Berlin, Jan. 1899.

Arendt, Theodor. Ueber die Zunahme der Blitzgefahr. p. 1.

——Zum Polarlicht, vom 9, September, 1898. p. 20.

Mienardus, Wilh. Der mitteleuropäische Winter und seine Beziehungen zum Golfstrom. p. 8.

Plumandon. J. R. Der Regen. p. 14. [From Ciel et Terre.]

Petermann's Mitteilungen, Gotha, 45 *Band.*

Supan, A. Vertikale Temperaturabnahme in der freien Atmosphäre. p. 19.

Ciel et Terre, Bruxelles, 19*me. année.*

Bentley, W. A., Perkins, G. H. Les cristaux de la neige. p. 543. [From Appletons Popular Science Monthly.]

Lancaster, A. La gelée et les anticyclones. p. 579.

Moye, M. Les étoiles filantes et la météorologie. p. 526.

Ramsey, A. La théorie cinétique des gaz et quelques-unes de ses conséquences. p. 513, also p. 571.

St. Hepites. Météorologie de l'Etna. p. 563.

Annales de Géographie, Paris, 1899.

Martonne, E. de. Sur un nouveau mode de représentation du régime des pluies dans les contrées intertropicales. p. 84.

Appleton's Popular Science Monthly, New York. Vol. 54.

Smith, Stephen. Vegetation a Remedy for the Summer Heat of Cities. p. 433.

National Geographic Magazine, Washington, Vol. 10.

Garriott, E. B. West India Hurricane of September 10–11, 1898. p. 17.

Philosophical Magazine, London, Vol. 47.

van Rijckevorsel. On the Analogy of some Irregularities in the Yearly Range of Meteorological and Magnetic Phenomena. p. 57.

Journal of School Geography, Lancaster, Vol. 3.

Fenneman, N. M. Climate of the Great Plains. p. 1, also p. 46.

Aeronautical Journal, London, Vol. 3.

Eddy, W. A. Some Kite Records in the United States. p. 15.

Hazen, H. A. Glaisher's Highest Balloon Ascension. p. 13.

Rotch, A. L. Progress in the Exploration of the Air with Kites at the Blue Hill Observatory. p. 17.

Scottish Geographical Magazine, Edinburgh, Vol. 14.

Newell, F. H. The Hydrography of the United States. p. 9.

Engineering News, New York, Vol. 41.

——The Mississippi River Floods and Methods for their Control. 5. 50. [Abstract of report of the Committee on Commerce, U. S. Senate.]

Lippincott, J. B. Low Water Measurements in the State of California during the Summer of 1898. p. 12.

HINTS TO OBSERVERS OF SHOOTING STARS.

By WILLIAM HARKNESS, Professor, U. S. Navy.

The star showers of November and other months attract

very general attention, and doubtless there are many persons scattered over the country who would gladly cooperate in observing them if they only knew how, the more especially as no expensive instruments are required, and the amount of astronomical knowledge demanded is very slight. For this reason it seems not inappropriate to specify here the apparatus required and the points to which attention should be directed.

The position selected from which to make the observations should have the horizon, in every direction, as free and unobstructed as possible. The apparatus requisite is as follows: A map of the stars in the vicinity of the radiant point. For this purpose a special map prepared by the U. S. Naval Observatory will be the most suitable; but if such a one is not to be obtained, any school celestial atlas—Burritt's, for instance—will answer perfectly well.

A lantern, or a lamp, so placed that while it is protected from the wind it will be in a convenient position to throw light on the star map.

A well-regulated watch. The error of the watch on local mean time[1] should be ascertained as accurately as possible, and if the time is to be used for the identification of the meteors when they are numerous, it will be necessary that it should be known to within one or two seconds. In all cases it should be stated how the error of the watch was obtained. However, let no one give up the idea of observing because he is not certain of the exact error of his watch. The observations may still be very valuable even if the recorded times are all erroneous by a constant quantity.

At the head of the sheet containing the observations should be given the date and the name of the place where they were made, together with the name of the county and State. Then for each meteor the following particulars should be recorded:

1. The hour, minute, and second at which it was seen. If many meteors are to be observed, it will be necessary to have an assistant whose sole business it will be to note the time at a preconcerted signal from the observer, so that the observer himself may devote all his attention to accurately determining the paths.

2. Its apparent size. If it is small, it may be stated that it appeared of the same size as a first, second, third, or fourth magnitude star, as the case may be; or of the same size as some particular star which is named. Larger meteors may be compared with Jupiter, Venus, or the Moon, by stating, for example, that they are half, one-third, or one-quarter as large; or their apparent diameter in minutes may be given, the Moon being used as a standard of measurement, and it being borne in mind that she is about thirty minutes in diameter.

3. Its color.

4. Its duration—that is, the length of time during which it was visible. If the observer be provided with a stop watch he will find it exceedingly convenient for this purpose, as it will only be necessary to start the second hand when the meteor appears and to stop it when it disappears in order to have the exact duration of its visibility. Unfortunately stop watches are rare, and other means will generally have to be resorted to. Probably counting the beats of a common watch or clock will be found the most available. At first the observer will be almost certain to overestimate the time of visibility, but after a little practice he will find that it is exceedingly short—for ordinary shooting stars less than half a second.

5. The position or altitude and azimuth of the point where it first became visible. This is best ascertained by noting carefully the position of the point in question relatively to the neighboring stars, and then, having found the same stars on the celestial map, it can be marked there in the same relative position to them and its right ascension and declination read off from the lines engraved on the map for that purpose. If the observer have no celestial maps and is unacquainted with the stars, then the only thing that he can do will be to note as carefully and accurately as possible the direction (as north, northeast, etc.) and altitude above the horizon of the point where the meteor first made its appearance. The best way for an unpractised observer to estimate altitudes will be for him to imagine the distance between the zenith and horizon divided into eight equal parts and then to state how many of these parts the object appeared above the horizon. Such observations will always be rough at the best, but still they are better than none.

6. Appearance; train, if any, and its duration. Give a minute description of anything peculiar about the meteor or its tail if it had one. If it was only an ordinary shooting star it must be so stated. If it left a luminous track, that should be mentioned, and also whether the track remained fixed in the sky till it gradually faded out or whether it appeared to undulate and float away. It should also be stated whether the track was a continuous streak of light or seemed to be composed of small sparks. It is always best to make a sketch of all large meteors, even if it is a rough one, as soon after seeing them as possible.

7. Length of path. It is better not to attempt to estimate this directly, as it can be much more satisfactorily ascertained by measuring on a celestial globe the distance between the points of appearance and disappearance of the meteor. However, if the point of disappearance is not otherwise noted the length of path must be stated as accurately as possible.

8. Direction; noting also whether horizontal, perpendicular, or inclined. State the direction in which the meteor moved, as, for example, from north to west; also whether the track was parallel to the horizon or inclined. If it was inclined, a very convenient way of estimating the amount of inclination will be to hold a watch with its face toward the meteor's path and with the twelve-hour mark vertical. Then, imagining the path to pass through the center on which the hands turn, state what hour and fraction of an hour it would pass through on the circumference.

9. Insert any remarks that may be necessary concerning points which have not been noted under the preceding heads.

10. At the close of the observations give the observer's name and title in full.

The above instructions are perfectly general, and are intended to apply to all observers, whether provided with star maps or not, and to all meteors, whether large or small. In order to adapt them to particular cases, it will be necessary to modify them somewhat.

If the observer is provided with star maps, then, instead of making the observations described under paragraphs 7 and 8, it will be much better for him to note the point of disappearance of the meteor among the neighboring stars, in the same way as is described at the beginning of paragraph 5 for its appearance. The points of beginning and ending of the track being noted in this manner, of course both the length and direction of the track are also known. The plan pursued at the United States Naval Observatory for recording the tracks of meteors is as follows: Each officer is provided with a suitable star map. When he sees a meteor he observes carefully its path among the stars and at once, turning to his map, he finds the same stars on it and draws the track in pencil in the same relative position to them that it occupied in the heavens. The right ascension and declination of the beginning and end of each track is subsequently read off from the map and tabulated.

In the case of a large meteor, of course the description will embrace all the particulars mentioned above; but if the me-

[1] NOTE.—The seventy-fifth meridian time can be obtained from any telegraph office.—ED.

teors are small and numerous, it will plainly be impossible to describe each one so minutely. Then it will be best to trace on a map as many of their tracks as possible, note the time of appearance of each, and give a general account of the shower, including all the points mentioned above. It will also be necessary to state the time of beginning and ending of the shower, and the time when it reached its height. This can best be determined by counting and recording the number of meteors that fall in each consecutive ten minutes.

Whenever meteors are numerous, it will be noticed that if we imagine their tracks to be produced backwards in the heavens they will all intersect at a common point. This is the radiant point, and its exact position is of such great importance that no observer should fail to determine it as accurately as possible.

The principal meteoric showers take place annually on the nights of the 9th, 10th, and 11th of August, and of the 12th or 13th of November. The August shower never attains the brilliancy which is sometimes displayed by the November one, but it is much more certain in its recurrence. Its radiant point is in the vicinity of the star B Camelopardali, while that of the November meteors is near the star γ Leonis. The nights which have just been mentioned are those on which it is most important to be on the watch for meteors. Nevertheless, they appear in greater or less numbers during almost every clear night, and as good observations of them are always valuable, the observer may rest assured that time so employed is never thrown away.

RECORDS BY THE KITE CORPS AT BAYONNE, N. J.

On page 161 of the MONTHLY WEATHER REVIEW for April, 1898, Mr. Allen communicated the results of 23 kite ascensions.

In the following table the records for ascensions Nos. 23–60 are given, bringing the record down to January 2, 1899. Mr. A. J. Henry has added the temperatures and winds from self-registers from New York City. At the beginning of the series the Weather Bureau thermometer in New York was 298 feet above ground and 314 above sea level, but on October 15, 1898, the instruments were moved to an adjacent building, and the new altitude of the thermometer is 313 feet above the ground and 350 feet above sea level. With regard to his own later observations Mr. Allen says:

> I enclose a list of thermometer ascensions, Nos. 23 to 60, in continuation of those published by you in April, 1898. I have noted those ascensions made with the use of piano wire, of which the Bayonne Kite Corps has over 4,000 feet and is preparing to get more.
>
> During November, December, and January I could not take more records, owing to the weather not being suitable for kiteflying and urgent calls upon my time, but I am hoping to begin regular ascensions soon. * * * Ascension No. 23 was the first made with piano wire.

For further details the reader is referred to the previous article in the April REVIEW.

It appears that Messrs. W. W. Hotchkins, Henry L. Allen, and William H. Mitchell organized themselves into the Bayonne Kite Corps on April 16, 1898, and that the home station is at Bergen Point. This step bespeaks a permanent interest in kiteflying for meteorological purposes that augers well for the future. It is to be hoped that larger kites with the Marvin meteorograph may eventually be brought into use at Bergen Point, Bayonne, N. J.

OBSERVATIONS AT RIVAS, NICARAGUA.

The records contributed for many years by Dr. Earl Flint, at Rivas, Nicaragua, include barometric readings. His present station is at 11° 26′ N., 85° 47′ W. The observations at 7:17 a. m., local time are simultaneous with Greenwich 1 p. m. The altitude of his barometer is 36 meters above sea level, but until the barometer has been compared with a standard it seems hardly necessary to publish the daily readings. The wind force is recorded on the Beaufort scale, 0–12. When cloudiness is less than $\frac{1}{10}$, the letter "F," or "Few," is recorded.

Thermometer ascensions made at Bergen Point, Bayonne, N. J., by the Bayonne kite corps.

Number.	Ascension. Date.	P. M. Began.	P. M. Ended.	Kite record. Altitude.	Kite record. Temperature. Max.	Kite record. Temperature. Min.	Local conditions. Temperature. Beginning.	Local conditions. Temperature. Ending.	Local conditions. Wind.	Local conditions. Sky.	New York. Temperature Beginning.	New York. Temperature Ending.	New York. Winds during ascensions. Direction.	New York. Winds during ascensions. Velocity.	Average daily temperature observed by Mr. Eadie, at Bayonne, N. J. Same day.	Second day.	Third day.
1	2	3 H. M.	4 H. M.	5 Feet.	6 °	7 °	8 °	9 °	10	11	12 °	13 °	14	15 Miles.	16 °	17 °	18 °
23	April 30, 1898	9 15	10 00	370*	59	56	56	57	wnw.	Clear to cloudy.	62	60	nw.	8	58.5	61.5	56.5
24	May 14, 1898	8 35	10 00	400*	59	56	59	55	ssw.	Partly cloudy.	60	59	s.	7	61	55	56.5
25	May 31, 1898	7 40	8 30	200	70	68	68	68	nne.	Partly cloudy.	73	69	ne.	5	68.5	70	64.5
26	June 10, 1898	7 25	7 45	300	79	76	79	76	sw.	Cloudy.	62	62	se.	9	70	67.5	79
27	June 10, 1898	8 40	9 45	275	76	70	76	72	sw.	Partly cloudy.	61	60	se.	8	70	67.5	79
28	June 14, 1898	8 30	9 30	500	81	76	81	70	w.	Partly cloudy.	79	78	w.	8	78.5	76	62.5
29	June 20, 1898	9 00	9 50	270	73	64	72	65	wsw.	Partly cloudy.	69	68	sw.	12	68.5	66	64
30	July 8, 1898	7 50	8 15	300	80	78	80	79	sw.	Cloudy.	81	80	sw.	14	74.5	77	71
31	July 12, 1898	9 00	9 30	250–300	69	66	69	68	ne.	Cloudy.	66	66	ne.	18	66	64	74.5
32	July 14, 1898	8 55	9 45	500	73	72	73	73	sw.	Cloudy.	74	73	sw.	15	74.5	82	77.5
33	July 16, 1898	8 50	10 45	250	74	70	74	65	sw.	Partly cloudy.	76	73	w.	7	77.5	73.5	75
34	July 22, 1898	9 40	10 10	400	73	68	72	72	e.	Cloudy.	70	69	e.	10	76	70.5	74
35	July 23, 1898	4 30	5 50	300	73	68	73	71	se.	Cloudy.	72	70	se.	7	70.5	74	73.5
36	July 25, 1898	2 40	5 30	1,541*	78	71	78	74	se. to s.	Cloudy, clearing.	73	72	se.	13	73.5	77	75
37	July 27, 1898	11 53†	12 25†	375	78	74	78	78	ne.	Cloudy.	74	73	ne.	6	75	76	84
38	July 27, 1898	4 15	4 35	325	75	73	78	75	e. to se.	Cloudy.	77	76	e.	6	75	76	84
39	July 29, 1898	10 43†	11 20†	350	84	80	82	85	sw.	Partly cloudy.	78	79	w.	8	84	85.5	82
40	August 5, 1898	8 00	9 00	375	77	68	77	70	wsw.	Clear.	77	75	w.	13	76.5	76.5	78.5
41	August 6, 1898	8 45	9 35	500*	77	70	72	71	sw.	Partly cloudy.	76	75	w.	14	76.5	78.5	82.5
42	August 13, 1898	4 20	5 00	500	76	74	76	75	nw.	Partly cloudy.	76	76	nw.	7	73.5	71.5	73.5
43	August 25, 1898	7 20	7 35	325	78	75	76	76	sw.	Partly cloudy.	80	80	sw.	24	79.5	74.5	71.5
44	August 30, 1898	7 15	7 33	300	80	77	78	78	sw.	Clear.	81	80	sw.	17	80	83.5	86.5
45	August 30, 1898	8 00	8 20	300	79	77	78	78	sw.	Clear.	80	79	sw.	15	80	83.5	86.5
46	September 5, 1898	2 32	5 04	600*	90	84	88	85	sw.	Partly cloudy.	84	85	s.	11	85	83.5	78
47	September 8, 1898	8 05	9 05	500	61	58	61	61	s.	Clear.	65	65	s.	8	70.5	70	70
48	September 10, 1898	5 15	5 48	500	73	66	73	68	ne.	Partly cloudy.	72	70	n.	18	70	64	65.5
49	September 16, 1898	7 52	8 26	500	68	66	67	67	s.	Partly cloudy.	67	67	s	11	73	77	78.5
‡50	September 19, 1898.	7 57	8 40	300	74	70	72	70	nw.	Clear.	75	72	nw.	10	75	64	58.5
	September 19, 1898.	8 02	8 37	280	75	70	72	70	nw.	Clear.	74	73	nw.	8	75	64	58.5
‡51	September 24, 1898.	9 16	10 22	500	58	51	58	55	ne.	Cloudy.	54	53	ne.	12	64.5	55	68.5
	September 24, 1898.	9 22	10 30	475	58	53	58	55	ne.	Cloudy.	54	53	ne.	12	64.5	55	68.5
52	September 28, 1898.	7 31	9 00	500	67	60	62	59	sw.	Clear.	69	66	sw.	8	66	67	70
53	October 8, 1898	5 45	6 08	500	65	62	65	64	wsw.	P. cloudy to cl'dy.	65	64	w.	10	61.5	63	56
54	October 8, 1898	9 30	11 07	1,100*	64	55	64	55	nw.	Partly cloudy.	63	59	nw.	9	61.5	63	56
55	October 22, 1898	7 30	8 07	300	54	48	54	51	wsw.	Partly cloudy.	54	53	ne.	30	63.5	52	53
56	October 22, 1898	8 15	8 47	300	50	48	50	48	wsw.	Partly cloudy.	53	50	ne.	30	63.5	52	53
57	October 29, 1898	4 55	5 25	300	49	46	49	47	ne.	Cloudy.	51	51	ne.	6	44.5	46.5	50.5
58	October 29, 1898	9 00	9 40	300	47	45	47	46	ne.	Cloudy.	50	50	ne.	7	44.5	46.5	50.5
59	November 12, 1898	8 00	8 30	400	40	38	38	38	wsw.	Clear to p. cl'dy.	43	42	w.	4	41	40	47
60	January 2, 1899	12 57	4 12	1,095*	22	10	22	16	sw.	P. cloudy to clear.	14	17	w.	10	12	20	36

*Piano wire used. †A. M. ‡Ascensions Nos. 50 and 51—two thermometers on same kite line.

This station is situated on the western shore of Lake Nicaragua, not far from the eastern end of the western division of the Nicaragua Canal. The volcano Ometepe, on an island in Lake Nicaragua, is about 10 miles northeast of the station. Mr. Flint's records occasionally mention the presence of clouds in the early morning on the summit of this mountain.

Observations at Rivas, Nicaragua, December, 1898.

OBSERVATIONS AT 7:17 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature. Air.	Temperature. Dew-point.	Wind. Direction.	Wind. Force.	Upper clouds. Kind.	Upper clouds. Amount.	Upper clouds. Direction from.	Lower clouds. Kind.	Lower clouds. Amount.	Lower clouds. Direction from.	Daily rainfall.
	°	°									
1	77	72	ne.					ks.	9	ne.	0.07
2	78	74	ne.					f.k.	10	ne.	0.00
3	78	75	ne.	1				ks.	10	ne.	0.00
4	78	74	ne.	1				f.k.	10	ne.	0.00
5	77	70	ne.	3				f.k.	1	ne.	0.00
6	77	69	ne.	3	c.	1		f.k.	3	ne.	0.00
7	77	70	ne.	3				f.k.	2	ne.	0.00
8	76	69	ne.	3				k.	3	ne.	0.00
9	77	73	ne.	2				k.	10	ne.	0.20
10	76	70	ne.	1				k.	8	ne.	0.00
11	75	71	ne.	1	cs.	10	ne.				0.00
12	76	70	ne.	1	ck.	1	ne.				0.00
13	75	71	ne.	2				*	Few	ne.	0.00
14	76	70	ne.	2				k.	1	ne.	0.00
15	76	69	ne.	2		0			0		0.00
16	76	70	ne.	2				ks.	1	ne.	0.08
17	76	70	ne.	2-3				ks.	10	ne.	0.06
18	75	71	ne.	2-3				k.	5	ne.	0.00
19	75	71	ne.	1				k.	Few	ne.	0.00
20	76	66	ne.	0				k.	1	ne.	0.00
21	76	70	ne.	1				k.	1.5	ne.	0.00
22	72.5	69	ne.	0				k.*	Few	ne.	0.00
23	74.5	72	ne.	1				k.	Few	ne.	0.00
24	75	71	ne.	2				k.	1	ne.	0.00
25	75	72	ne.	2				k.	Few	ne.	0.00
26	74.5	61	ne.	2				k.*	Few	ne.	0.00
27	75	70	ne.	1				n.	10	ne.	0.23
28	73	72	ne.	0				k.	10	ne.	2.15
29	74	71	ne.	3				k.*	Few	ne.	0.00
30	75	71	ne.	3				ks.	1	ne.	0.10
31	76	72	ne.	2				ks.	1	ne.	0.25
Sums											3.14
Means	75.7										

*Cumuli on Ometepe.

OBSERVATIONS AT 8:43 P. M. SEVENTY-FIFTH (8 P. M. LOCAL) TIME.

Date.	Temperature. Air.	Temperature. Dew-point.	Wind. Direction.	Wind. Force.	Upper clouds. Kind	Upper clouds. Amount.	Upper clouds. Direction from.	Lower clouds. Kind.	Lower clouds. Amount.	Lower clouds. Direction from.
	°	°								
1	77	73	ne.	0					Few	
2	80	74	ne.	2					0	
3	79	73	ne.	1				f.	Few	ne.
4	81	76	ne.	2	ck.	5	ne.			
5	78	73	ne.	3				k.	10	ne.
6	79	73	ne.	1				k.	10	ne.
7	79	72	e.	2		0		*	0	
8	79	73	se.	2.5		0			0	
9	78	73	ne.	1				k.	Few	?
10	79	72	ne.	2		0			0	
11	79	73	ne.	1				f.ks.	8	
12	79	73	ne.	0		0			0	
13	79	73	ne.	2	c.	Few	ne.			
14	77	70	ne.	2	c.	0		*		
15	79	72	ne.	2		0		*	0	
16	77	70	ne.	1	c.	Few	ne.	*		
17	76	73	ne.	3				k.	10	ne.
18	76	73	ne.	1	ck.	2	ne.			
19	76	73	se.	1	c.	Few	se.			
20	79	72	se.	1	c.	Few	se.	*		
21	78.5	72	se.	0		0			0	
22	78.5	72	e.	0	cs.	Few	e.			
23	78	73	ne.	2		0			0	
24	78	71	ne.	1	c.	8	ne.			
25	78	73	ne.	2		0			0	
26	78	71	ne.	2				k.*	8	ne.
27	77	73	ne.	2				k.	4	
28	74	71	e.	0				k.	9	e.
29	78	73	ne.	3-4				f.k.	Few	ne.
30	78	75	ne.	1				ks.	Few	ne.
31	79	74	ne.	1		0		*	0	
Means	77.4									

*Cumuli on Ometepe.

Observations at Rivas, Nicaragua, January, 1899.

OBSERVATIONS AT 7:17 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature. Air.	Temperature. Dew-point.	Wind. Direction.	Wind. Force.	Upper clouds. Kind.	Upper clouds. Amount.	Upper clouds. Direction from.	Lower clouds. Kind.	Lower clouds. Amount.	Lower clouds. Direction from.	Daily rainfall.
	°	°									
1	76	73	ne.	2				k.	10	ne.	0.10
2	76	70	ne.	2	cs.	3		k.	7	ne.	0.00
3	76	70	ne.	2-3				k.	3	nc.	0.00
4	76.5	70	ne.	2				k.	2	ne.	0.12
5	76	70	ne.	2				k.*	Few	ne.	T.
6	76.5	69	ne.	1				ks.	3	ne.	0.03
7	76	71	ne.	1				f.k.	8	ne.	0.00
8	75	68	ne.	3				k.*	Few	ne.	0.00
9	75.5	70	ne.	1				k.*	Few	ne.	0.00
10	75	70	e.	1				k.	2	e.	0.00
11	77	70	ne.	2				f.k.	8	ne.	0.00
12	76	71	ne.	1	ck.			ks.	10	ne.	0.16
13	76	71	ne.	2	ck.		sw.	f.ks.	3	ne.	0.00
14	76	70	ne.	2	cs.	2	se	k.	1	ne.	0.43
15	75.5	71	ne.	3				k.	5	ne.	0.00
16	75.5	70	ne.	1-2	cs.	9	sw.	k.	10	ne.	0.00
17	76	71	ne.	1				ks.	10	ne.	0.00
18	75	69	ne.	1				k.	1	ne.	0.00
19	75	68	ne.	1				k.*	Few	ne.	0.00
20	74.5	68	ne.	3				k.*	Few	ne.	0.00
21	75	71	ne.	1	cs.	9	sw.	k.	1	ne.	0.01
22	74.5	68	ne.	1	c.	4	s.			se.	0.00
23	75.5	70	ne.	1				k.	10	ne.	T.
24	76	73	se.	0				k.	5	se.	0.00
25	75	71	ne.	2	c.	Few	sw.	k.	Few	ne.	0.00
26	76	71	ne.	2				k.	10	ne.	0.00
27	76	72	ne.	1				k.	1	ne.	0.00
28	74.5	71	se.	0	f.c.	6	sw.		1	se.	0.00
29	76	70	ne.	2	cs.	7	s.	k.	1	ne.	0.00
30	76	71	e.	2				k.	1	e.	0.00
31	75	71	ne.	1				k.	5	ne.	0.00
Sums											0.85
Means	75.8										

*Cumuli on Ometepe.

OBSERVATIONS AT 8:43 P. M. SEVENTY-FIFTH (8 P. M. LOCAL) TIME.

Date.	Temperature. Air.	Temperature. Dew-point.	Wind. Direction.	Wind. Force.	Upper clouds. Kind.	Upper clouds. Amount.	Upper clouds. Direction from.	Lower clouds. Kind.	Lower clouds. Amount.	Lower clouds. Direction from.
	°	°								
1	78	72	ne.	1				ks.	Few	ne.
2	77	72	ne.	1		0			0	
3	78	72	ne.	2-3				k.	Few	ne.
4	78.5	71	ne.	2		0		*	0	
5	78	72	ne.	1				k.	Few	ne.
6	77	72	ne.	2				ks.	10	ne.
7	78	69	ne.	3		0		*	0	
8	78	72	ne	0		0			0	
9	78	72	e.	0		0			0	
10	77	73	ne.	1				ks.	10	ne.
11	78	72	e.	2	ck.	6	ne.			
12	77	73	ne.	2				k.	8	ne.
13	79	73	e.	1		0			0	
14	77	74	e.	0				k.	10	e.
15	78.5	69	ne.	3		0		*	0	
16	78	72	e.	2	c.	Few	e.			
17	77	73	e.	0	c.	10	sw.			
18	79	72	ne.	1	f.c.	5	ne.			
19	78	69	ne.	2-3	c.	Few	ne.	†		
20	77	68	ne.	2				f.k.	8	ne.
21	76	71	ne.	1	c. k.	8	sw.			
22	78	72	e.	2	c.	5	se.	k.		e.
23	76	74	se.	0	cs.	2	se.			
24	79	73	se.	1	cs.	3	se.	k.		
25	78	73	se.	2				k.	1	se.
26	78	74	se.	1				f.k.	2	se.
27	78	71	ne.	0		0		†	0	
28	78.5	71	e.	1	c.	Few	se.			
29	78	73	ne.	1				k.	8	ne.
30	79	73	ne.	2		0			0	
31	78	72	ne.	1				sk.	Few	ne.
Means	77.8									

*Cumuli on Ometepe. †Cap on Ometepe.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made nearly in accordance with the new form, No. 1040, and the arrange-

ment of the columns, therefore, differs from those previously published.

Meteorological observations at Honolulu.

JANUARY, 1899.

The station is at 21° 18′ N., 157° 50′ W.; altitude 50 feet.
Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.
The average direction and maximum force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, connected by a dash, indicate change from one to the other.
The rainfall for twenty-four hours is now given as measured at 1 p. m. Greenwich time on the respective dates.
The rain gauge, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time.									
				Temperature.		Means.		Wind.		Total rainfall.	Average cloudiness.	Sea-level pressures.	
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Maximum force.			Maximum.	Minimum.
	*	†	†			‡	‡		§				
1	29.99	67	65	80	63	65.0	81	se.	1	0.00	1–10	30.01	29.94
2	29.98	67	65	80	65	65.7	79	ne.	3	0.00	8–0	30.05	29.97
3	29.95	67	66	78	64	65.0	79	ne.	2	0.00	6	30.01	29.92
4	29.98	63	62	81	65	66.0	85	ne–nw.	2	0.32	6	30.00	29.94
5	29.95	68	65	78	63	62.5	75	nne–se.	1	0.00	1	30.04	29.92
6	29.98	65	64.5	78	65	64.3	79	ne–se.	1	0.00	6–1	30.00	29.91
7	29.98	66	65	78	63	66.7	85	s–sw.	1	0.04	2–8	29.99	29.90
8	30.07	70	66	78	65	67.3	86	sw.	1	0.39	2	30.07	29.98
9	30.07	71	65	79	65	64.5	73	ne.	2	0.00	1	30.13	30.02
10	30.02	69	65	76	65	59.7	63	nne.	3	0.00	5–1	30.12	30.02
11	30.01	72	65	76	67	63.0	74	ne.	5	0.02	3	30.05	29.98
12	30.00	65	62	79	69	61.3	64	ne.	3	0.00	5	30.06	29.97
13	30.00	68	65	79	63	61.7	73	e.	1	0.00	1	30.02	29.97
14	30.05	61	59	80	64	62.3	72	sw.	1	0.00	2	30.02	29.96
15	30.11	69	65	79	60	61.7	75	sw–ne.	1	0.00	0–1	30.11	30.00
16	30.10	71	66	80	65	63.0	70	ne.	3	0.05	5–3	30.16	30.06
17	30.07	71	65	78	69	63.3	71	ne.	3	0.05	5	30.15	30.06
18	30.01	65	63	77	69	62.7	69	ne.	3	0.00	6	30.11	30.00
19	29.94	61	60	79	63	62.3	78	nne.	2	0.00	5	30.05	29.92
20	29.99	60	59	79	60	60.5	73	s.	1	0.00	0–5	30.01	29.94
21	29.98	66	63.5	80	59	62.3	76	ne.	2	0.00	2–5	30.07	29.95
22	29.96	69	63.5	79	61	61.7	69	nne.	2	0.00	2–6	30.06	29.95
23	29.93	64	62	79	69	59.3	65	se–e.	2	0.00	1–4	29.99	29.89
24	29.93	62	61	80	63	61.3	72	se–s.	2	0.00	1	29.98	29.87
25	29.92	67	66	79	61	63.5	78	se–sw.	2	0.28	1–3	29.97	29.88
26	29.97	60	57	78	64	61.7	78	w–nw.	3	0.00	10–0	29.96	29.88
27	29.99	63	59	74	59	55.0	70	n.	2	0.01	1	30.04	29.94
28	29.93	62	59	75	56	56.0	70	nne.	3	0.00	4	30.02	29.91
29	29.90	63	60.5	75	61	57.7	65	nne.	3	0.03	2–4	29.94	29.84
30	29.84	63	61	75	61	59.7	69	nne.	3	0.01	3–1	29.92	29.82
31	29.84	64	63	79	61	62.3	77	ne–e.	2	0.02	3–6	29.89	29.82
Sums.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.22	.....	.....	.....
Means.	29.981	65.8	63.0	78.0	63.4	62.2	73.9	.....	‖	....	¶	30.030	29.935
Departure.	+ 0.3	.....	.....	.....	.....	0.0	−1.1	.....	.....	−2.05	.....	.....	.....

Mean temperature for January, 1899 (6+2+9)÷3=70.4°; normal is 70.0°. Mean pressure for January is 29.98; normal is 29.95.
* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4:30 p. m., Greenwich time. ‡ These values are the means of (2+9+6)÷4. § Beaufort scale. ‖ Mean for the daytime is 2.0. ¶ The mean during daylight is 3.6.

THE NORTHWEST GALES OF THE SOUTHERN BLUE RIDGE AND PIEDMONT REGION.

By BARRY C. HAWKINS, Voluntary Observer, Horse Cove, Highlands, N. C.

At first thought it would seem easy to divide all the winds of the globe into two classes, viz, (1) *general*, such as occur over all the sphere, as the general circulation of the atmosphere, cyclones, anticyclones, etc., (2) *local*, such as the sea breeze occurring where conditions favor or permit, and other local phenomena such as the "bora" wind occurring only in one or a few localities. But when we look deeper we find there are no atmospheric movements confined to one place, and that the features called "local" are repeated wherever the conditions are such as to produce them.

The foehn wind is not confined to Switzerland, but is well known on the North American continent, as the chinook wind. As Professor Abbe has pointed out many times in the MONTHLY WEATHER REVIEW,[1] dynamic heating occurs not only in the chinook wind but on the south side of every cyclone, and in general whenever some air ascends and cools other air must descend and be warmed. Some do not seem ready to admit this warming, although they ascribe much to the cooling by the ascent of air.

The winds I shall describe are perhaps not specially local, but so far as I know they have not been described. These winds are severe northwest gales, occurring on the eastern slope of the southern Blue Ridge Mountains, and extending into the Piedmont region for at least 50 miles. The time of occurrence is the winter season, less frequently in the autumn and spring, and very rare in summer. When well developed they last at least twelve hours, but not often more than twenty-four hours, twelve hours being about the average. The greatest velocity is often attained between midnight and 3 a. m., and generally they are quite as violent, if not more so, at night as in the daytime. The favorite time for the gale to commence is sundown, and there seems to be some connection between their beginning and ending and the rising or setting of the sun. No considerable amount of rain or snow ever occurs with these gales, as their commencement is synonymous with the clearing up of a storm, when the wind shifts from southwest to northwest and the clouds break away. As soon as the gales begin the clouds, which are always of the character of fracto-stratus, fracto-nimbus, or fracto-cumulus, begin to move from the northwest with a much increased and great velocity. The gale sometimes begins below and does not affect the cloud level until later, but more often the clouds show it first. Sometimes the upper clouds begin to move from the northwest, while the lower storm clouds are still moving from southwest. In this case the latter clouds moving from the southwest are gradually pushed southeastward by the northwest wind, and sometimes thrown into rolls stretching arch-like from northeast to southwest. In all cases the clouds present an extremely torn and ragged appearance like all clouds torn by high winds; the different portions of the cloud move in different directions, the upper part forward, the lower backward. Gradually the clouds diminish in size till the air becomes perfectly clear. The altitude of these clouds always exceeds 5,000 feet above sea level. Although they may touch the ground before the gale commences they never do so during the gale.

The actual velocity of the gusts in these gales must often equal 60 miles per hour during a few seconds, the velocity varying greatly, from a light breeze one minute to a hurricane velocity the next. A marked feature is the lack of uniformity horizontally. The gale blows in gusts of a few rods in extent, and these gusts do not always move straight ahead, but whirl and eddy and show all the phenomena of a stream flowing over a rocky bed where the water runs in all directions and is thrown into eddies innumerable, but still pursues a general course.

As soon as the gale begins, the relative humidity of the air rapidly falls, often to 20 per cent or lower. These gales usually are attended by a rapid fall of temperature, and sometimes by a severe cold wave, the lowest temperature occurring when the gale stops. Whether warming by dynamic compression ever occurs in descending the eastern slope to the Piedmont region, is a question. Sometimes, but rarely, a marked rise in temperature is noted, usually in the spring.

The foehn effect that is noted by Abbe as occurring on the eastern slope is a question I have not, therefore, been able to decide. It is stated by him that when west winds with clearing weather occur the rain ceases at such Piedmont stations as Charlotte and Atlanta some time before the same clearing weather occurs at Washington on account of the foehn effect, although the temperature effect (rise) is slight.

The weather maps have been studied in reference to the conditions causing these gales, etc. The following conditions have always been noted on the dates of gales, viz:

[1] See REVIEW, January, 1897, page 18, and December, page 545.

1. A low pressure or cyclone on the east of a line running north and south and passing through this station.
2. A comparatively steep barometric gradient on the west of the line.
3. Clearing weather and *brisk* winds, but not usually gales, at Augusta, Charlotte, Atlanta, and Chattanooga.

It is thus seen that the conditions that produce northwest gales here are the same as produce northwest winds everywhere; but the difference here is in the fact that a gale occurs at my station when only a fresh or brisk wind is noted elsewhere. The velocity of the winds on the eastern slope of the Blue Ridge is greater than the barometric gradient calls for.

It seems to me that the reason for this may be that the slope of the land *increases the velocity* of the cold, heavy air flowing down an inclined surface, just as the swiftness of a stream is increased in proportion as the bed is steeper. I can not say whether the velocity of winds is commonly increased in this manner, but this is the only reason I can think of to explain the gales. It would seem, therefore, that this is a case resembling the bora wind, the velocity being caused by the descent in that case.

These winds resemble the foehn in their extreme dryness, but I am unable to say whether they are drier than ordinary northwest winds in general. The problem is, therefore, this: Why do severe gales occur on the eastern slope of the Blue Ridge and upper Piedmont region when only *brisk* winds are noted at surrounding stations?

HYDROLOGY OF THE LAKE MINNETONKA WATERSHED.

By GEO. W. COOLEY, C. E., Minneapolis, Minn.

Lake Minnetonka covers an area of 23 square miles and receives its supply from an area of 115 square miles. It is situated in Hennepin County, Minn., at an elevation of 915 feet above sea level and is from 8 to 20 miles west of Minneapolis, the metropolis of the State. Its central point is located in latitude 44° 56′ N. and longitude 93° 36′ W.

The basin is of glacial formation, and its surface is rolling, interspersed with many marshes of irregular outline and varying extent, and was formerly covered with a large body of timber known as the "big woods." The surface soil is from 1 to 2 feet in depth, of rich loam, with a clay subsoil of unknown depth.

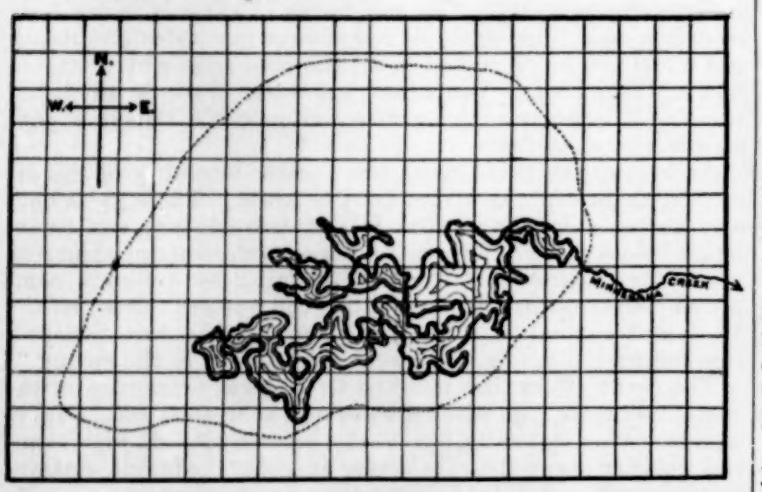


FIG. 1.—Outline of lake and watershed. (Each square represents 1 mile.)

There are occasionally found pockets of sand throughout the basin, but none of great extent, nor any that can be traced as water-carrying strata. In 1864, the year of the writer's first acquaintance with this watershed (which knowledge was considerably enlarged by surveys and explorations during subsequent years), the amount of forest land was approximately 75 per cent of the entire land area. At present it hardly exceeds 20 per cent, the loss occurring entirely through the cultivation of its fertile soil.

By reference to Fig. 1 it will be seen that the outline of the lake is very irregular, with an extreme breadth of 5 miles and a length of 11 miles, the shore line is almost exactly 100 miles in extent, a feature which will be found of considerable importance in determining the proportion of precipitation which enters the lake from the adjacent land.

During the years 1894 and 1895 the writer made a series of soundings covering the entire lake, aggregating many thousands in number, for the purpose not only of determining the depth but also the character of the bottom. The depth in the larger portion of the lake was from 30 to 100 feet, the former being a fair average for the entire lake. The bottom was found invariably covered with vegetable matter and soft mud, which deposit has been produced by the washings from the hillsides and the decay of vegetable matter growing in the lake, and which has resulted in making the bed of the lake literally water-tight. I am so well satisfied from long-continued observations of the imperviousness of this bed that I have not allowed the factor of infiltration to enter into my calculations.

There are no springs of any consequence within several miles of the lake except that known as Purgatory, situated about two miles from its southeastern extremity and about one mile outside the watershed. It was supposed for years by many residents that this spring received its supply through underground sources from the lake, but a careful survey demonstrated the fact that its supply was received from an independent drainage area, mainly covered with tamarack swamp and meadows, which served to produce a fairly regular flow.

With the foregoing description in mind we will proceed to consider the conditions of supply and discharge.

RAINFALL.

The average rainfall at Minneapolis and Lake Minnetonka from 1881 to 1898, inclusive, is 28.14 inches, which latter figure has been used in my calculations, as it was during these years only that the records of rise and fall were kept. The rainfall by years was as follows:

Years.	Yearly.	Summer.	Winter.	Years.	Yearly.	Summer.	Winter.
	Inches.	*Inches.*	*Inches.*		*Inches.*	*Inches.*	*Inches.*
1881	34.73	27.33	5.58	1890	27.08	22.18	5.49
1882	22.95	16.11	7.28	1891	26.97	17.82	7.63
1883	26.98	21.00	6.41	1892	37.90	33.11	6.71
1884	29.68	22.81	4.32	1893	32.17	23.35	7.42
1885	26.66	23.42	6.97	1894	22.80	17.17	3.54
1886	29.58	20.65	8.16	1895	21.44	18.85	4.36
1887	32.79	23.80	9.53	1896	30.65	22.77	10.11
1888	30.12	24.24	4.53	1897	30.50	23.82	4.24
1889	18.36	12.55	6.34	1898	25.77	21.10	.....

Making an average yearly fall, as before stated, of 28.14 inches, which I have divided, as above, into two parts, showing the fall during that part of the year when the lake was open and in that part when it was covered with ice, the latter period generally comprising the months of November, December, January, February, and March.

The average precipitation in this vicinity for fifty-three years ending with 1898 is 27.29 inches. The earlier years of this period were taken from the Fort Snelling records 20 miles east by south. A large majority were from the Minneapolis observations taken 15 miles east, while those for the past eighteen months were from observations taken at the lake.

The averages for these two periods are 21.78 and 6.39, respectively.

PROPORTION OF WATER THAT REACHES THE LAKE.

Great difficulty in determining the coefficient of available rainfall, or the so-called percentage of "run off," has always been experienced and must depend largely upon the judgment of the investigator, except where assisted by actual measurement of the stream carrying the run off and by long-continued and carefully kept records of evaporation.

The first series of measurements of Minnehaha Creek, the only outlet of the lake, were taken during the years 1871 to 1878 and resulted in showing an average discharge of 75 to 90 cubic feet of water per second, the latter of which would give about 0.80 cubic foot per second per square mile of drainage area, an estimate considerable higher than the average of Minnesota watersheds.

After the spring of 1881 the writer established a system of water gauges on the lake, which have been carefully maintained ever since, and from this record has been prepared a profile of the various stages of water, shown on Fig. 4. It will be noticed by this profile that there were three periods during which no water ran out of the lake, the first comprising a period of thirty-two and one-third months, from September 15, 1889, to May 25, 1892; the second from August 15, 1895, to April 15. 1896; and the third from July 15, 1896, to February 15, 1897. The very small amount that flowed out during the early part of the first period has been disregarded as not being sufficient to affect the calculations.

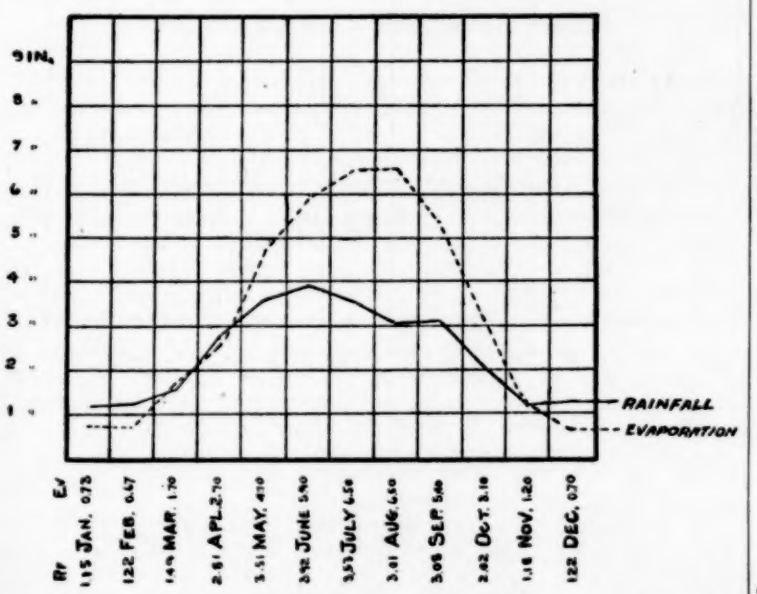


FIG. 2.—Evaporation and rainfall.

There were a number of other periods, of from one to two months, during which the flow of the creek was stopped by a dam a few miles below the outlet, and during such periods of dead water daily observations were taken of the rise and fall of the lake, rainfall, inflow, etc., for the purpose of determining the evaporation, and at one time such records were kept for about five hundred consecutive days.

Frequent measurements were also made of the flow from the lake at every stage of water, and while these observations were not continuous, sufficient were taken to insure a fairly accurate result. From these various measurements, among which the rise and fall have been continuously kept for eighteen years, I have estimated the percentage of rainfall collected by the lake at 42, and while this is seemingly in excess of the amount generally considered as available from a watershed of this nature, it must be noticed, by an examination of Fig. 1, that 35 square miles of the watershed lie within 1 mile of the lake and within the next mile zone there are 20 more square miles of drainage ground.

These conditions are favorable to a very large factor of available rainfall over at least 60 per cent of the gathering ground, and this factor would, in time of heavy showers, when the soil was highly saturated, probably reach as high as 75 per cent. From such conditions I consider the general factor of 42 per cent as close as can be attained.

EVAPORATION.

This factor was not obtained from the use of evaporating pans, but by actual measurement on the entire lake surface during the times when the lake was a closed basin.

During these periods several gauges were established at different points on the lake, from 3 to 5 miles apart, and simultaneous readings taken. From these observations, carefully checked, I append the following table of monthly evaporation from a natural water surface in this vicinity:

	Inches.
November 15 to April 1	4.3
April	2.7
May	4.7
June	5.9
July	6.5
August	6.5
September	5.4
October	3.1
November 1 to November 15	0.7
A total of	39.8

I refer, by permission, to the report of Mr. Tracy Lyon, master mechanic of the Chicago Great Western Railway, who, in a report to the White Bear Lake Improvement Association in 1897, gives the evaporation from the surface of the lake as follows:

	Inches.
January	0.5
February	0.7
March	1.3
April	2.4
May	3.8
June	5.3
July	6.2
August	5.9
September	4.8
October	3.4
November	2.1
December	0.9
Total	37.3

As to the evaporation during the months when the lake was covered with ice, this has been determined in several ways; first, by an actual measurement of the fall of water during the winter, including a period commencing after the freezing of the ground and ending before the spring supply was released from the land; second, by measurement of the loss of snow in places protected from interference by other agencies. For some observations on evaporation from ice and snow surfaces at low temperatures the writer would refer to the following:

Fitzgerald on Evaporation, Transactions of American Society of Civil Engineers, Vol. XV, pages 610 and 614.

Fanning's Water Supply Engineering, page 87.

Loomis's Treatise on Meteorology, page 56.

Greely's Report, Expedition, Lady Franklin Bay, Vol. II, pages 366, 370, 371.

Hayes's Arctic Boat Journey, 1854, page 157.

Richardson's Franklin Search Expedition, page 299.

Hayes's Voyage of Discovery Toward the North Pole, 1861.

Four of which refer to evaporation in high northern latitudes, under temperatures from 50° to 90° below freezing point.

Fig. 3 shows the monthly ratios of outflow from the lake, together with the curve of the same for the St. Croix River,

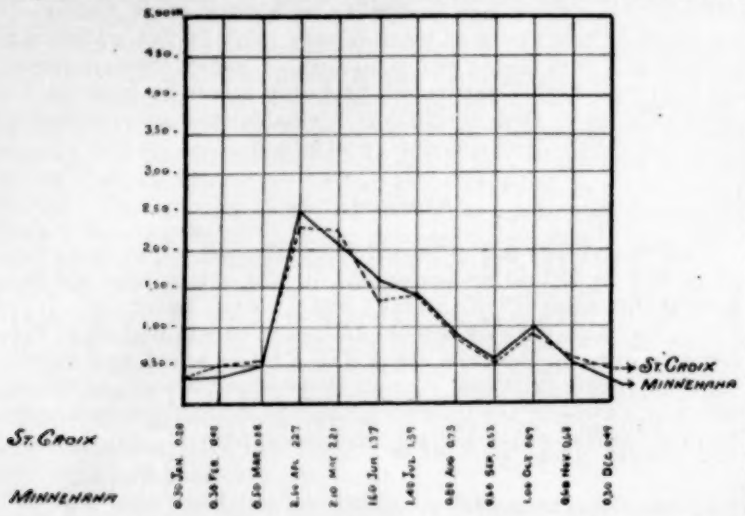


FIG. 3.—Monthly ratio of flow, Minnehaha Creek and St. Croix River.

which enters the Mississippi about 50 miles southeasterly, the watershed of which very closely approximates in its surface conditions that of Lake Minnetonka.

RUN OFF.

The actual run off in any stream may be determined by the following formulæ:

For a watershed without lakes

$$F = 0.884\ L\ R\ C.$$

For a watershed with large lakes as receiving reservoirs

$$F = (R + \frac{L\,R\,C}{W} - E) \times 0.884\ W, \text{ in which}$$

F = Flow in cubic feet per second.
R = Precipitation in feet.
L = Land surface of watershed in square miles.
W = Water surface of reservoirs in square miles.
E = Evaporation in feet.
C = Coefficient of available rainfall.

The constant 0.884 is equal to the number of feet in a square mile divided by the seconds in a year.

With a watershed of 115 square miles, of which 90 miles is land surface, the following will be the conditions for the flow of Minnehaha Creek:

$L = 90.$
$R = 2.345.$
$W = 25.$[1]
$E = 3.317.$
$C = 0.42.$

Applying the formula, we have:

$F = 56.86$ cubic feet per second as the average yearly flow or discharge from Lake Minnetonka. By using the first formula for the flow from the land surface into the lake, $F = 78.34$ cubic feet per second, leaving 21.48 cubic feet per second, in addition to the rainfall of 2.345 feet on the lake surface as entirely lost by evaporation; a total loss of 39.8 inches, or 3.317 feet. From the foregoing observations and calculations, I offer the following conclusions concerning this watershed:

Total area	115 square miles.
Land area, including small lakes	90 square miles.
Lake Minnetonka	25 square miles.
Annual precipitation	2.345 feet.
Annual evaporation from lake	3.317 feet.
Coefficient of available rainfall	0.42.
Run off per second from land surface to lake	78.34 cubic feet.
Run off per second from lake	56.86 cubic feet.
Precipitation per second per square mile	2.073 cubic feet.
Run off to lake per second per square mile	0.870 cubic feet.
Run off from lake per second per square mile	0.494 cubic feet.
Proportion of run off to precipitation	23.83 per cent.

[1] Though the lake proper is but 23 square miles in extent, there are 2 square miles of adjoining marshy shores which for all purposes of storage and evaporation are assumed to be part of the lake.

It will be interesting to note the gradual decrease in the average stage of water in this lake, as shown by the water gauge records. Commencing at 1885 and taking the average of the three preceding years as a starting point, the succeeding averages are as follows:

Year.	Averages.	Year.	Averages.	Year.	Averages.
	Feet.		*Feet.*		*Feet.*
1885	221.29	1890	220.52	1895	220.20
1886	221.08	1891	220.28	1896	220.08
1887	220.93	1892	220.21	1897	220.02
1888	220.97	1893	220.29	1898	220.00
1889	220.78	1894	220.30		

As the years 1882 and 1883 were years of exceedingly high water it will not do to assume that the average stage has lowered 1.29 foot since 1885. I think, however, that during the past thirty years there has been at least one foot of lowering of the average stage which has undoubtedly been caused by the increase of evaporation from the land surface and consequent decrease of the coefficient of available rainfall.[1]

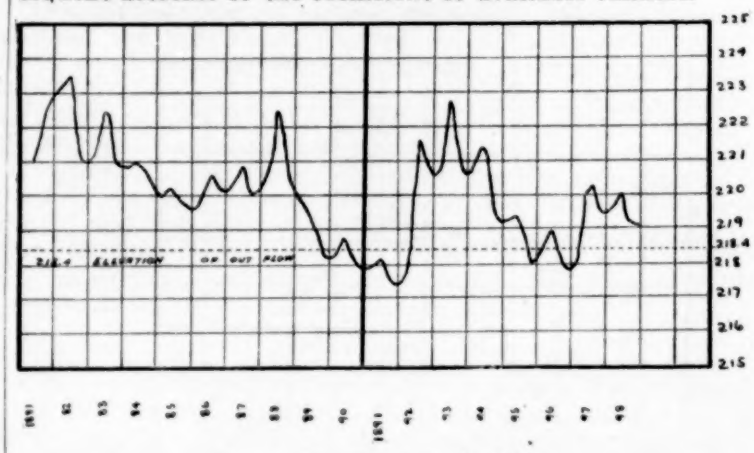


FIG. 4.—Profile of rise and fall.

The run off from land surface to lake during the several months is estimated as follows:

November 15 to April 1 precipitation 5.67 inches, of which 4.3 inches evaporated from the lake surface, leaving a gain on the lake surface of 1.37 inch, to which must be added 5.67 inches precipitation on the land surface, minus 3 inches lost by evaporation equal to 2.67 inches on 90 square miles. Of this land water 75 per cent reaches the lake in the spring flow.

	Inches.
November 15 to April 1 a total of	12.88
April, 75 per cent of land water plus rainfall	11.40
May, 60 " " " " " "	11.09
June, 35 " " " " " "	8.86
July, 25 " " " " " "	6.71
Aug. 25 " " " " " "	5.72
Sept. 30 " " " " " "	6.41
Oct. 50 " " " " " "	5.66
Nov.[2] 60 " " " " " "	1.85
Total received in lake	70.58
Less evaporation	39.83
Net for discharge	30.72

The average flow of 56.86 cubic feet per second will draw

[1] This assumes that the average rainfall has not changed.—ED.
[2] Fifteen days.

from the lake a depth of 0.00717 feet per day, equal to 30.88 inches per year.

As a rule the entire winter precipitation, generally of snow, is retained on the land and lake surface until about April 1, when all that remains after evaporation is carried very quickly by the spring thaw into the lake.

Further experiments and measurements will be made by means of a weir cut in the dam lately erected by the county at the outlet, and the daily flow determined more accurately, for the purpose of verifying or correcting the estimates of flow herein given. All of which results will be presented to the public in due course of time.

NOTES BY THE EDITOR.

CHARLES S. GORGAS.

Mr. Charles S. Gorgas, observer, Weather Bureau, died at Norfolk, Va., 1:30 a. m. January 21, 1899; age 42 years. His death is announced with regret and his connection with the Bureau will be pleasantly remembered by those with whom he was associated. Mr. Gorgas was born in New York City and was educated in the public schools of that city and in the Spencerian Business College at Washington, D. C. He entered the Government meteorological service November 16, 1882, and performed duty at the following-named stations: Cape Henry, Va., Atlanta, Ga., and Norfolk, Va., as assistant; Fort Robinson, Nebr., Fort Laramie, Wyo., Valentine, Nebr., and Savannah, Ga., as official in charge; and at Washington, D. C., as clerk.—*H. E. Williams.*

METEOROLOGICAL RECORDS IN IOWA.

Mr. J. P. Walton publishes in the Saturday Mail, Muscatine, Iowa, a paper read by him before the Muscatine Academy of Science of February 13, 1899, relative to the early work of Hon. T. S. Parvin. Mr. Parvin settled in Cedar Rapids, Iowa, July 4, 1838, but soon removed to Bloomington, now Muscatine. He apparently began keeping a weather record on December 1, 1838, in diaries and blanks of his own devising; beginning with 1847 he used the Smithsonian blanks. His barometric record began in 1850. In order to get his barometer out to this distant place in 1850, a friend brought it to him from Washington carefully strapped upon his back. When Mr. Parvin moved from Muscatine to Iowa City in October, 1860, he turned over the instruments and records to Rev. John Ufford, and in April, 1863, the latter turned them over to Mr. Josiah P. Walton who now has the complete collection since January 1, 1839.

It is very rare that an observer has the privilege of consulting such a long record at one place, and we hope that Mr. Walton will favor the readers of the MONTHLY WEATHER REVIEW with many studies into the climatic changes that have taken place in Iowa. His paper read before the Muscatine Academy gives us a foretaste of what may be expected. For instance, he finds that in fifty years there have been ten Januaries that have had less than one inch of rainfall. They may be called dry Januaries, and of these ten months he says:

> The Februaries that followed were six wet and four dry; the Marches were three wet and four dry, the other three being average; the Aprils were six wet and two dry; the Mays were eight wet and one dry; the Junes were five wet and one dry; the Julys, six wet and one dry, so that on the whole the ten dry Januaries were followed by an increase of precipitation in every month. Of these ten dry Januaries, three were preceded by dry Decembers and two by wet Decembers, the remaining five being average.

Applying this result to the current year, he says:

> December, 1898, and January, 1899, were dry, but unless the next six months are an exception to former years, we can look for a better season for grass and for oats than for corn. Oats and grass prosper better with April, May, and June wet and July dry for harvesting. Corn requires but little rain until July, but will stand any amount after shooting.

HISTORY OF WEATHER TELEGRAPHY.

Mr. William Foster, jr., of Warwick, R. I., sends to the Editor some interesting notes about the early agitation of the question of a Government weather bureau. He states that—

> In 1837–39 I published the Windham County Gazette, at Brooklyn, Conn., and occasionally had a paragraph on the subject of the weather, advocating a systematic series of observations to develop the law of storms. I removed to Providence in 1856, where I also had something to say on this subject in the press, insisting that the Government should extend its weather work as widely as possible. Subsequently I reported auroras, meteors, etc., to Prof. Joseph Henry. I recollect that in one of my early paragraphs I instanced a severe damaging West Indian storm, which had traveled up the coast, as an example to illustrate the beneficent results that would have been attained if its progress had been noted and transmitted northward.

THE TUGRIN FOG DISPELLER.

This consists of an outlook pipe, 8 feet long and 3 inches inside diameter, with a wide flange at the mouth, placed so as to be convenient to the navigating officer. A tube enters the pipe from below and a blower sends a powerful stream of warm air through the tube and the pipe straight ahead, blowing a hole right through the fog, which is rolled back in every direction; the moisture is said to condense and fall in raindrops, and the navigating officer is enabled to see through the densest fog for several hundred feet.

If this blower operates satisfactorily in a horizontal direction, it ought also to do so in a vertical, and the region around the blower should, therefore, be well wetted by the raindrops that are thus formed out of the fog. It may be an expensive operation, but we commend it to attention on the coast of California, where it is desired to utilize the fog.

THE INTERNATIONAL DATE.

With the increase in rapid transit and ocean cables across the Pacific, it becomes more and more desirable to adopt a system of dates and hours that will be free from the uncertainties and confusions of the present.

The committee on standard time, which made a report to the American Metrological Society in 1875, out of which grew the first step in the reformation of time reckoning, concluded its report by expressing a belief that the only permanent, satisfactory solution of the question would consist in using Greenwich time and Greenwich dates throughout the whole globe. The Greenwich day begins, according to our civil reckoning at Greenwich, midnight, which is simultaneous with local noon on the one hundred and eightieth meridian, near the middle of the Pacific Ocean.

The details of the times at which various events have occurred in Europe, Asia, and America, from day to day, as published in our daily telegraphic columns, keep one continually consulting the degrees of longitude and perpetually figuring out how long it is since they happened.

All this is rectified the moment we begin to use one single

standard of time. As soon as the cable companies agree upon such a standard there will be a fair prospect of its adoption by the newspapers and, eventually, by all civilized communities. Meanwhile, the elaborate table published in the London Geographical Magazine for February, 1899, will be very useful to those who are studying the cable reports from all parts of the world published in our daily papers.

SENSIBLE TEMPERATURES.

In the midst of the hot weather in the summer of 1898, an editorial in the New York Times suggested that the Weather Bureau modify the terms "warmer" and "cooler," as employed in forecasting the temperature.

Hitherto these terms have been supposed to refer exclusively to the temperature of the air, as indicated by the dry bulb thermometer. The suggestion is made that we combine the figures indicating temperature, humidity, and velocity of the winds into a single figure that would express just what people mean when they say and feel that the day is hot or cold. The new suggested figure would vary directly with the temperature and humidity, but inversely as the velocity of the wind.

The problem is much more difficult than is here suggested. We have frequently explained that the sensation of temperature differs with every individual, and will vary with the same individual according to his physical and mental condition. We think it must be left to each individual to predict his own sensations when once the Weather Bureau has predicted the temperature, moisture, and pressure of air and the velocity of the wind.

ORIGIN OF THE WORD "BLIZZARD."

On page 562 of the December REVIEW, we have given a reference to the use of the word "blizzard" as quoted from the Hutchinson County Herald, but it appears that the original of this goes further back, viz, to the "Dakota Republican," published at Vermilion during the winter of 1867–68.

FORESTS AND SNOWFALL.

In the January report of the Wyoming section, Mr. W. S. Palmer states that the snowfall for the month was unusually heavy, and a corresponding amount of moisture is thus stored for irrigation during the next summer. The average snowfall for the State was 15.2 inches. At the end of the month the snow was from 31 to 48 inches deep on the summits of a number of hills and peaks. On the snowy range the depth was 21 inches at an elevation of 8,700 feet, 16 inches at 9,000 feet, 24 inches at 10,000, and 43 inches at 11,000 feet. Mr. A. L. Foster, reporting on the snowy range, says:

The second growth of timber continues to hold from 6 to 10 inches more snow than the larger and more thickly wooded districts. Water in all streams is above the normal.

We have here an allusion to a very important service rendered by the forest. The latter retards the flow of the wind among its branches and foliage, and affords abundant opportunity for the driven snow to settle and rest upon the ground. It does not increase the quantity of moisture, but it preserves the fallen snow and rain to a remarkable extent.

RECENT EARTHQUAKES.

Reports from Mexico describe the earthquake of Monday evening, January 24, as the severest ever known in the City of Mexico. The first oscillation began at 5:09 p. m., local time. It was from northeast to southwest and lasted one minute and fifty-six seconds. Three minutes later came a second shock, which lasted five seconds, oscillating northwest and southeast. The earthquake was felt over the entire Republic of Mexico. At Colima it lasted one minute and twenty seconds; at Vera Cruz it lasted ten seconds. But few reports of this earthquake have been received from the United States, although it must have been feebly felt at many stations.

At San Bernardino, Cal., a shock was felt at 4:45 p. m., January 25. The newspapers of that city state that the shock was of a little greater severity than usual and that the barometer dropped from 30.12 to 29.86, "an unusual occurrence during a norther, probably due to an earthquake." Of course the latter suggestion is wholly inadmissible, and popular ignorance of this subject should not be increased by disseminating the idea that the atmospheric pressure can be affected by an earthquake. On the other hand, there is some basis for the idea that in rare cases a large change in the atmospheric pressure may give occasion for an earthquake, a result that is barely conceivable, but has never yet been demonstrated.

The Marvin seismograph at Washington recorded no earthquake during January. Professor Morley reports that his seismograph at Cleveland, Ohio, showed a considerable disturbance some time during the month. The direction of the vibrations was 10° east of north and 10° west of south, and there were about half a dozen vibrations. Having been laid up with illness, Professor Morley was unable to examine his apparatus at the proper time, and therefore could not state the date of the occurrence. The fact that no other station in the United States reported the Mexican earthquake of January 24 would indicate that the disturbance at Cleveland must have occurred on some other date.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for 26 stations selected out of 113 that main-

tain continuous records, the mean hourly temperatures deduced from the Richard thermographs described and figured in the Report of the Chief of the Weather Bureau, 1891–92, p. 29.

Table IV gives, for 26 stations selected out of 104 that maintain continuous records, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use. Both instruments are described in the Report of the Chief of the Weather Bureau, 1891–92, pp. 26 and 30.

Table V gives, for about 130 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891–92, p. 19.

Table VI gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table VII gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table VIII gives, for about 70 stations, the average hourly sunshine (in percentages) as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table IX gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table X gives the record of excessive precipitation at all stations from which reports are received.

Table XI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

NOTES EXPLANATORY OF THE CHARTS.

Chart I.—Tracks of centers of high areas. The roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the highest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a ridge of high pressure.

Chart II.—Tracks of centers of low areas. The roman letters show number and order of centers of low areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the lowest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a trough or long oval area of low pressure.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII.—The total snowfall. This is based on the reports from all available observers and shows the depth of the snowfall during the month in inches. In general, the depth is shown by lines and areas of equal snowfall, but in some cases figures are also given for special localities.

Chart IX.—Depth of snow on ground. This chart is based essentially upon reports from regular and special observers and shows the depth of snow lying on the ground at the end of the month, which is, therefore, the accumulated excess of the snowfall over its loss by melting, evaporation, and settling.

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1899.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. and 8 p. m. +2.	Mean reduced.	Departure from normal.	Mean max. and min. +2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				
New England.																													
Eastport	76	69	74	29.94	30.04	+ .04	37.3	+ 0.5									74	3.85	— 0.1									5.3	
Portland, Me	103	81	89	29.94	30.05	.00	21.2	+ 0.8	47	5	30	—12	2	12	45	19	15	76	3.86	— 0.1	13	10,683	w.	48	e.	6	11	5	15	5.8	16.5
Northfield	872	15	65	29.10	30.12	+ .05	23.3	+ 0.8	52	5	32	—10	2	15	35	19	12	64	3.39	— 0.2	10	5,782	nw.	28	nw.	11	10	15	6	4.9	11.2
Boston	125	115	181	29.97	30.11	+ .05	14.8	— 0.7	58	5	26	—20	28	3	44	13	10	83	1.77	— 1.4	12	7,607	s.	48	sw.	5	8	11	12	6.0	11.6
Nantucket	14	43	54	30.11	30.12	+ .09	29.2	+ 2.2	57	5	38	— 3	2	20	33	24	17	64	4.19	+ 0.1	9	9,695	w.	40	nw.	25	18	3	10	4.3	6.1
Woods Hole	22	51	57	.....	.....	.....	32.7	+ 1.3	52	6	40	6	11	25	31	30	26	80	2.74	— 1.0	14	10,021	nw.	44	ne.	1	9	8	14	6.3	7.7
Vineyard Haven	.....	30	.....	.....	.....	.....	30.4	+ 0.1	54	25	37	2	2	24	28	.....	.....	.....	3.25	— 0.5	11	12,517	sw.	52	sw.	15	13	7	11	4.9	3.8
Block Island	27	39	48	30.11	30.14	+ .06	34.0	+ 0.6	55	25	42	6	2	26	32	.....	.....	.....	3.72	+ 0.1	10	8,134	sw.	36	n.	1	9	10	12	5.8	3.3
Narragansett	.....	10	.....	.....	.....	.....	30.4	— 0.7	53	24	37	5	11	24	21	28	23	72	5.18	+ 1.0	11	11,799	nw.	45	e.	6	11	10	10	5.1	2.7
New Haven	107	118	140	30.02	30.14	+ .03	29.2	+ 0.4	50	*	33	— 5	2	19	35	.....	.....	.....	6.04	+ 0.7	10	.....	nw.	.....	.....	.....	20	2	9	....	3.0
Mid. Atlan. States.							27.8	+ 0.3	52	5	36	— 4	2	19	32	25	20	74	4.33	0.0	11	7,441	sw.	36	w.	15	17	4	10	4.5	8.2
Albany	97	84	113	30.04	30.16	+ .07	32.4	0.0										75	3.24	— 0.4								5.5	
Binghamton	875	79	90	.....	.....	.....	22.9	— 0.3	51	5	32	—10	2	14	32	20	15	76	2.50	— 0.4	10	6,729	s.	32	se.	21	10	11	10	5.8	9.4
New York	314	313	346	29.81	30.16	+ .05	22.4	0.0	54	5	31	—11	11	14	34	.....	.....	.....	1.79	— 1.2	10	5,578	nw.	39	w.	14	10	8	13	5.9	10.5
Harrisburg	377	94	104	.....	.....	.....	30.8	+ 0.3	56	5	38	5	2	24	37	28	23	75	4.08	0.0	12	11,240	nw.	66	nw.	25	14	7	10	5.0	6.1
Philadelphia	117	168	184	30.05	30.18	+ .03	28.6	— 1.7	54	5	36	1	2	22	26	.....	.....	.....	2.27	— 1.4	11	5,522	w.	40	w.	27	9	10	12	5.9	8.7
Atlantic City	52	68	76	30.12	30.18	+ .07	32.3	+ 0.3	56	5	40	6	11	25	29	28	23	71	4.01	+ 0.6	12	7,942	sw.	42	nw.	24	10	8	13	5.9	5.8
Cape May	24	52	70	30.17	30.19	.....	33.3	+ 0.8	54	17	41	5	2	26	27	30	27	81	2.40	— 1.4	13	9,296	sw.	43	nw.	25	9	11	11	5.3	4.4
Baltimore	123	68	82	30.04	30.18	+ .04	34.0	— 0.4	51	14	40	8	11	28	26	31	.....	..	3.01	— 1.4	14	.....	n.	46	nw.	25	10	11	10	5.6	3.4
Washington	112	59	76	30.06	30.19	+ .03	33.4	— 0.6	59	5	41	6	2	26	27	29	23	69	3.50	+ 0.2	14	3,840	sw.	24	w.	27	15	5	11	4.9	5.3
Cape Henry	.....	5	34	.....	.....	.....	33.4	+ 0.2	60	5	42	— 1	2	25	31	29	23	72	4.12	+ 0.6	14	4,863	s.	32	nw.	7	15	3	13	5.1	8.3
Lynchburg	585	83	88	29.42	30.20	+ .05	40.4	+ 0.2	73	6	49	12	2	32	35	.....	.....	.....	3.19	— 1.0	13	10,492	s.	.....	.....	...	8	12	11	5.9	3.4
Norfolk	92	102	111	30.10	30.20	+ .06	36.6	— 0.2	63	14	46	9	2	27	32	32	27	75	4.95	+ 1.0	13	3,066	ne.	26	nw.	7	14	4	13	5.5	7.5
Richmond	144	98	105	.....	.....	.....	41.3	+ 0.9	73	6	50	18	2	32	32	37	34	82	3.05	— 0.8	13	7,265	s.	36	w.	24	12	8	11	5.2	4.6
S. Atlantic States.							37.6	.....	66	24	47	10	29	28	33	.....	.....	.....	2.94	.....	13	5,146	.....	28	n.	1	9	10	12	5.7	8.0
Charlotte	773	68	76	29.34	30.19	+ .04	46.2	+ 0.2										80	4.06	— 0.2								6.0	
Hatteras	11	17	36	30.17	30.18	+ .06	40.3	— 0.9	66	6	49	16	2	32	29	36	31	76	4.31	— 0.8	12	5,726	sw.	34	sw.	24	8	6	17	6.3	5.5
Kittyhawk	9	12	30	.....	.....	.....	48.4	+ 2.7	71	6	54	28	29	43	20	46	43	83	4.47	— 1.4	15	11,529	n.	58	n.	28	12	7	12	5.3	T.
Raleigh	375	93	101	29.80	30.21	+ .06	45.1	+ 2.7	68	14	54	20	29	37	31	.....	.....	.....	4.50	— 0.6	12	11,852	.....	.....	.....	...	12	6	13	5.8	T.
Wilmington	78	82	90	30.11	30.20	+ .06	40.4	— 0.4	73	6	50	14	2	31	31	36	32	79	3.37	— 0.1	13	5,103	n.	32	s.	6	10	7	14	5.6	7.7
Charleston	48	14	92	30.16	30.21	+ .06	47.2	+ 0.3	73	6	57	18	2	38	39	42	38	79	2.40	— 1.5	12	6,394	n.	36	sw.	6	10	7	14	5.6	0.2
Columbia	.....	5	.....	.....	.....	.....	49.9	— 0.1	71	5	57	27	2	43	29	44	40	76	2.84	— 1.2	12	8,375	n.	34	n.	1	5	15	11	5.9	
Augusta	180	89	103	29.99	30.19	+ .05	44.6	— 1.1	76	6	55	22	2	34	36	.....	.....	.....	5.41	+ 1.6	13	.....	nw.	.....	.....	...	10	5	16	6.2	4.9
Savannah	52	63	89	30.10	30.19	+ .05	45.9	— 0.7	73	6	55	26	2	37	30	41	37	78	5.76	+ 1.3	13	4,826	ne.	30	sw.	6	12	6	13	5.7	T.
Jacksonville	43	69	84	30.12	30.17	+ .03	50.6	— 0.4	76	6	59	30	2	42	31	45	42	81	3.59	+ 0.3	11	6,669	n.	38	nw.	6	7	10	14	6.4	
Florida Peninsula.							55.2	0.0	78	6	63	38	8	48	23	51	49	88	3.98	+ 0.7	17	5,863	ne.	32	sw.	24	4	11	16	6.9	
Jupiter	28	13	30	30.08	30.11	.00	65.7	+ 2.0										84	4.96	+ 2.3								5.7	
Key West	22	43	50	30.08	30.10	+ .01	67.8	+ 2.1	80	31	74	48	20	62	26	63	61	84	4.30	+ 0.9	17	8,591	nw.	34	s.	16	6	18	7	5.5	
Tampa	36	60	67	30.09	30.13	— .01	70.6	+ 0.9	80	14	75	58	20	66	15	67	65	86	4.12	+ 2.0	9	8,769	ne.	38	n.	18	8	17	6	5.2	
East Gulf States.							61.8	+ 3.1	79	5	70	42	20	54	24	56	54	82	6.45	+ 3.9	10	5,303	ne.	33	s.	28	5	13	13	6.5	
Atlanta	1,131	92	126	28.97	30.20	+ .02	49.1	— 0.8										78	5.36	+ 0.2								6.3	
Pensacola	56	78	90	30.09	30.15	.00	42.2	— 0.3	66	6	50	23	7	35	35	38	35	79	3.69	— 2.5	14	7,353	nw.	36	w.	24	6	9	16	6.5	2.4
Mobile	57	88	96	30.09	30.16	+ .01	51.9	— 0.6	73	31	59	30	1	44	35	48	45	82	2.72	— 2.0	14	7,853	ne.	36	nw.	6	7	11	13	6.2	
Montgomery	221	100	112	29.93	30.18	+ .01	50.2	— 0.3	72	14	58	27	1	42	35	47	46	88	4.46	— 0.6	14	5,712	n.	30	nw.	6	11	9	11	5.2	
Meridian	375	84	94	.....	.....	.....	46.3	— 2.0	71	6	55	27	1	38	36	43	40	65	5.72	+ 0.4	13	4,862	e.	25	nw.	10	6	7	18	6.9	3.5
Vicksburg	247	65	73	29.85	30.13	— .03	46.6	— 0.4	69	4	57	18	31	36	41	.....	.....	.....	7.32	+ 2.0	15	4,546	n.	30	w.	24	8	8	15	6.6	0.4
New Orleans	54	112	120	30.08	30.14	+ .02	47.3	0.0	74	4	56	20	1	39	30	42	37	72	10.37	+ 4.8	13	5,714	se.	30	w.	13	6	10	15	6.4	T.
Port Eads	.....	27	...	.....	.....	.....	53.2	— 0.6	75	10	61	29	1	45	27	49	46	83	2.44	— 2.7	13	6,419	n.	42	nw.	6	6	8	17	6.5	
West Gulf States.							54.8	— 1.9	73	13	63	38	20	47	24	...	...	....	6.19	+ 1.8	9	.....	n.	.....	.....	.....	7	6	18	....	
Shreveport	249	77	84	29.86	30.14	— .02	47.2	+ 0.6										76	4.58	+ 1.1								5.6	
Fort Smith	481	63	72	29.59	30.12	— .03	46.4	+ 0.5	71	13	56	20	1	37	28	41	36	72	4.02	— 0.6	9	5,799	se.	33	w.	13	8	7	16	6.2	T.
Little Rock	357	93	100	29.76	30.16	— .01	39.0	+ 2.9	65	22	48	8	31	30	33	34	29	73	2.49	+ 0.1	13	5,483	e.	34	sw.	25	11	7	13	5.6	0.7
Corpus Christi	20	42	50	30.08	30.10	— .03	39.8	— 1.0	63	4	49	7	31	31	27	36	32	78	6.96	+ 2.1	11	6,103	nw.	36	w.	4	11	6	14	5.7	4.6
Fort Worth	670	106	114	.....	.....	.....	55.0	— 0.5	78	13	62	28	1	48	25	51	49	84	2.36	— 0.5	10	7,304	n.	39	nw.	23	13	7	11	5.0	
Galveston	54	85	96	30.05	30.10	— .02	42.0	.....	70	4	53	12	31	31	44	.....	.....	.....	1.24	.....	7	7,643	nw.	30	nw.	23	9	12	10	5.6	0.1
Palestine	510	54	61	29.57	30.13	— .08	53.0	+ 0.3	70	23	59	28	1	47	30	49	46	82	10.39	+ 6.7	16	7,540	e.	39	nw.	23	11	5	15	6.1	
San Antonio	704	95	104	29.36	30.12	— .01	46.6	+ 2.8	70	13	56	18	31	37	35	42	39	79	5.48	+ 1.2	9	5,532	n.	24	nw.	23	9	11	11	5.7	
Ohio Val. & Tenn.							50.9	— 0.6	78	4	62	20	1	40	37	44	38	67	0.38	— 1.3	5	6,875	se.	42	nw.	23	16	5	10	4.5	
Chattanooga	762	106	112	29.36	30.21	+ .05	34.6	+ 0.4										77	4.30	+ 0.1								6.4	
Knoxville	1,004	10	88	29.09	30.20	+ .02	40.8	— 0.2	62	4	49	18	31	32	33	36	31	74	4.82	— 1.8	13	5,648	s.	42	sw.	24	6	12	13	6.3	0.2
Memphis	399	140	154	29.73	30.17	+ .01	38.6	+ 0.9	63	4	47	10	31	30	26	35	31	79	3.70	— 1.8	11	5,727	sw.	37	sw.	4	11	9	11	5.4	6.7
Nashville	545	128	134	29.58	30.19	+ .04	40.6	+ 0.7	66	4	48	7	31	33	24	37	33	78	5.78	+ 0.3	13	8,253	s.	48	sw.	13	8	9	14	6.3	3.2
Lexington	990	75	102	.....	.....	.....	38.5	+ 0.3	65	4	47	6	31	30	30	34	31	78	5.59	+ 0.5	15	6,100	s.	36	s.	4	9	7	15	6.3	7.2
Louisville	525	114	136	29.58	30.17	+ .01	33.8	+ 0.5	63	4	41	4	31	26	28	..	....	....	6.69	+ 2.9	15	9,934	s.	55	w.	14	5	10	16	7.0	5.8
Evansville	434	72	82	.....	.....	.....	35.0	+ 0.9	64	4	43	4	31	27	30	31	26	75	4.30	+ 0.3	12	7,514	s.	49	sw.	4	6	4	21	7.4	9.2
Indianapolis	823	154	164	29.22	30.15	+ .01	33.6	.....	60	4	40	— 1	31	27	29	....	....	....	5.10	.....	11	6,882	s.	33	s.	4	7	12	12	5.9	5.2
Cincinnati	628	152	157	29.47	30.18	+ .08	28.2	— 0.1	54	4	36	— 5	29	21	30	26	22	77	3.52	+ 0.5	11	9,485	s.	41	w.	26	4	8	19	7.1	2.7
Columbus	824	87	100	29.24	30.17	+ .04	32.3	— 0.2	62	4	40	4	31	24	27	29	25	78	3.32	— 0.1	13	6,635	sw.	48	sw.	14	10	8	13	5.9	5.6
Pittsburg	842	116	123	29.22	30.16	+ .02	29.4	+ 1.0	61	4	37	0	31	22	31	27	24	84	2.35	— 1.0	9	7,011	s.	35	sw.	14	9	13	9	5.5	4.6
Parkersburg	638	77	84	29.48	30.20	+ .07	31.4	+ 0.8	66	4	39	5	31	23	28	27	22	71	3.41	+ 0.3	14	5,398	sw.	37	nw.	14	6	13	12	6.5	19.2
Elkins	1,940	41	51	.....	.....	.....	32.4	— 0.3	66	4	41	— 4	2	24	33	29	25	79	3.87	+ 0.8	12	5,240	s.	38	nw.	26	9	9	13	6.1	11.2
Lower Lake Region.							30.2	.....	64	4	41	—18	2	19	49	.....	.....	....	4.26	.....	17	4,250	w.	.....	.....	...	5	8	18	7.0	10.5
Buffalo	768	178	206	29.23	30.11	+ .03	25.5	+ 0.2										75	2.37	— 0.3								7.1	
Oswego	335	76	87	29.72	30.11	+ .02	25.4	+ 1.0	56	4	32	— 2	31	18	27	22	17	72	2.88	— 0.1	17	15,124	sw.	72	w.	26	0	13	18	8.2	13.3
Rochester	523	81	90	29.51	30.10	+ .02	23.6	— 0.7	56	5	32	— 7	10	16	32	21	16	76	2.73	— 0.2	17	10,895	se.	48	w.	14	4	9	18	7.3	18.5
Erie	714	92	102	29.32	30.13	+ .04	25.4	+ 1.5	58	4	33	— 1	31	18	31	21	16	72	2.54	— 0.6	19	7,410	sw.	42	sw.	14	4	11	16	7.2	16.6
Cleveland	762	190	201	29.26	30.13	+ .03	26.5	— 0.4	61	4	34	— 6	31	19	29	23	19	78	1.50	— 1.8	9	10,775	sw.	45	sw.	4	1	8	22	7.5	5.8
Sandusky	629	62	74	29.41	30.13	+ .02	26.4	+ 0.2	58	4	34	0	31	19	29	23	16	66	2.45	— 0.1	12	13,208	s.	58	sw.	14	4	15	12	6.2	5.9
Toledo	674	122	127	29.36	30.12	+ .02	27.2	+ 0.7	55	4	34	— 1	29	20	31	24	20	78	3.13	+ 0.9	14	7,493	sw.	37	w.	26	3	10	18	7.4	4.2
Detroit	730	160	166	29.29	30.13	+ .04	25.8	— 0.3	54	4	33	— 2	31	19	29	23	19	76	1.97	— 0.1	11	9,510	sw.	36	w.	26	7	11	13	6.3	4.2
Upper Lake Region.							24.0	— 0.5	50	4	30	— 4	31	18	30	22	19	80	1.75	— 0.2	13	9,749	sw.	46	sw.	26	3	13	15	7.0	4.2
Alpena	609	61	65	29.34	30.05	— .01	17.1	— 0.5										84	1.23	— 0.8								6.2	
Escanaba	612	43	57	29.33	30.04	— .02	17.8	— 0.3	42	15	25	—13	31	11	35	17	14	82	0.88	— 1.6	12	7,988	w.	37	nw.	26	4	16	11	6.4	5.5
Grand Haven	628	55	64	29.34	30.06	.00	18.1	— 0.9	37	13	21	—28	31	5	35	12	11	89	1.48	— 0.1	10	6,595	sw.	34	nw.	26	11	7	13	5.9	12.7
Marquette	734	67	95	29.14	29.99	— .06	23.8	— 0.4	45	4	30	— 4	31	17	28	22	20	86	2.01	— 0.6	16	10,471	sw.	47	nw.	26	3	7	21	7.8	12.5
Port Huron	639	70	106	29.37	30.11	+ .02	13.6	— 2.4	41	15	20	—18	31	7	26	12	11	90	1.64	— 0.4	15	8,973	sw.	44	nw.	26	7	8	16	6.7	19.4
Sault Ste. Marie	624	58	65	29.26	29.99	— .03	23.0	+ 1.2	51	4	30	— 8	31	16	31	21	19	88	2.02	0.0	13	10,453	s.	50	sw.	26	6	10	15	6.4	7.1
Chicago	824	241	274	29.19	30.12	+ .02	11.8	— 2.5	37	4	21	—28	31	3	48	11	9	89	1.61	— 0.2	12	6,303	sw.	41	nw.	4	6	6	19	7.3	15.3
Milwaukee	671	106	149	29.33	30.10	+ .01	23.0	— 0.4	48	4	30	—13	29	16	33	22	19	82	0.58	— 1.6	9	14,558	sw.	52	w.	26	10	9	12	5.5	2.6
Green Bay	617	49	57	29.35	30.07	— .04	20.4	+ 1.0	46	4	28	—16	29	13	36	19	14	73	0.45	— 1.7	7	9,014	sw.	41	sw.	26	9	9	13	5.5	5.1
Duluth	702	95	106	29.21	30.04	— .07	14.8	+ 0.6	39	4	23	—26	31	7	38	13	10	82	0.98	— 1.4	11	6,774	sw.	36	sw.	26	9	11	11	5.5	8.1
North Dakota.							9.4	— 1.0	37	20	18	—32	30	1	36	8	3	78	0.67	— 0.4	8	7,625	sw.	48	nw.	26	11	9	11	5.5	7.5
Moorhead	935	54	60	28.97	30.08	— .09	6.8	+ 4.3										75	0.41	— 0.2								4.9	
Bismarck	1,674	16	29	28.16	30.09	— .10	6.2	+ 7.1	40	20	15	—26	28	— 3	42	5	3	89	0.56	— 0.2	7	8,752	nw.	45	se.	11	13	9	9	4.9	4.4
Williston	1,872	15	31	27.92	30.09	— .08	8.6	+ 4.1	48	21	19	—25	30	— 2	42	6	—2	68	0.09	— 0.5	6	7,714	nw.	52	nw.	25	15	6	10	5.2	0.8
Upper Miss. Valley.							5.5	+ 1.6	44	21	15	—29	30	— 4	43	5	0	74	0.58	0.0	9	6,866	w.	60	n.	25	18	8	5	4.5	5.8
Minneapolis	.....	99	...	.....	.....	.....	24.0	+ 2.9										76	1.16	— 0.6								5.2	
							13.7	+ 1.8	43	30	23	—26	30	5	34	....	....	....	0.77	— 0.1	7	9,244	w.	38	nw.	25	12	10	9	....	8.0

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1899*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. and 8 p. m.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Up. Miss. Val.—Con.																															
St. Paul	837	114	124	29.09	30.07	— .08	13.7	+ 3.1	41	20	23	—26	30	5	34	11	8	80	0.87	— 0.1	8	6,344	nw.	36	nw.	25	14	10	7	4.5	8.0
La Crosse	720	70	78	.....	.....	.....	17.2	+ 2.5	42	13	26	—24	30	8	43	.....	.....	.....	0.37	— 0.9	8	5,921	sw.	36	sw.	26	13	12	6	4.3	4.3
Davenport	599	71	79	29.41	30.10	— .04	24.0	+ 4.0	48	3	33	—14	29	15	36	21	17	78	0.31	— 1.4	7	6,308	sw.	36	sw.	26	12	7	12	5.3	0.8
Des Moines	867	84	88	29.14	30.14	— .03	23.8	+ 6.3	51	20	33	—16	30	14	33	20	17	80	0.29	— 1.0	5	6,516	sw.	27	sw.	2	14	11	6	4.5	1.7
Dubuque	698	101	109	29.31	30.11	— .01	20.3	+ 3.0	46	4	30	—18	29	11	37	17	13	76	0.51	— 1.2	7	6,076	nw.	32	nw.	30	16	7	8	4.5	3.3
Keokuk	614	64	78	29.44	30.13	— .01	27.8	+ 4.6	54	3	36	—11	29	19	33	24	18	72	0.49	— 1.2	6	6,434	sw.	36	w.	26	10	15	6	4.7	1.0
Cairo	359	87	93	29.76	30.17	+ .02	34.8	+ 0.1	64	4	42	0	31	28	31	32	28	78	5.46	+ 1.6	11	7,971	s.	54	w.	4	5	13	13	6.4	7.8
Springfield, Ill	644	82	92	29.42	30.14	— .01	27.2	+ 1.7	52	4	34	— 9	31	20	24	19	75	1.51	— 0.6	11	7,608	s.	30	nw.	26	7	8	16	6.5	3.6
Hannibal	534	75	107	.....	.....	.....	29.0	+ 3.1	54	4	37	— 9	29	21	37	.....	.....	.....	0.56	— 1.0	6	7,867	sw.	36	nw.	26	13	5	13	5.8	3.1
St. Louis	567	111	210	29.51	30.16	+ .02	32.6	+ 2.1	61	22	41	— 4	31	25	32	28	23	73	1.66	— 0.5	11	7,933	s.	37	w.	26	9	7	15	6.0	2.9
Missouri Valley.							25.2	+ 5.0										70	0.45	— 0.6										4.8	
Columbia	.....	4	84	.....	.....	.....	30.1	+ 0.1	66	22	41	—14	29	20	35	.....	.....	.....	0.71	— 1.2	7	6,873	s.	37	nw.	26	8	9	14	6.3	4.0
Kansas City	963	78	95	29.06	30.14	— .04	30.9	+ 5.5	61	21	40	— 5	29	22	38	26	20	69	0.28	— 0.9	5	7,985	se.	36	se.	2	11	11	9	5.1	0.9
Springfield, Mo	1,324	100	103	28.67	30.14	.00	32.0	— 0.3	62	22	40	— 7	31	24	32	28	23	72	1.94	— 0.5	12	8,554	s.	32	n.	23	12	6	13	5.9	2.1
Topeka	.....	81	.....	.....	.....	.....	30.6	+ 3.8	60	21	40	— 6	29	21	35	.....	.....	.....	0.39	— 0.7	5	.....	s.	.....	.....	.....	.....	.....	.....	.....	.....
Lincoln	1,199	74	84	28.76	30.12	— .08	25.8	+ 8.1	61	21	36	—14	30	15	34	21	16	71	0.11	— 0.7	5	8,362	s.	48	n.	28	15	10	6	4.0	1.2
Omaha	1,103	92	97	28.87	30.11	— .08	25.1	+ 5.9	58	21	34	—15	30	16	31	21	16	73	0.07	— 0.6	5	6,398	s.	36	nw.	23	17	8	6	3.7	0.6
Sioux City	1,139	96	164	.....	.....	.....	21.1	+ 4.8	57	21	30	—19	30	12	37	.....	.....	.....	0.08	— 0.7	2	9,791	s.	56	nw.	25	15	8	8	4.1	0.2
Pierre	1,572	50	62	28.30	30.09	— .11	18.6	+ 5.9	55	21	30	—21	30	7	43	13	3	55	0.47	0.0	9	7,126	nw.	59	nw.	25	15	7	9	4.7	3.0
Huron	1,306	56	67	28.58	30.09	— .12	16.4	+ 9.4	50	20	30	—24	30	3	47	12	8	80	0.26	— 0.2	4	9,831	nw.	48	nw.	26	18	8	5	4.1	0.3
Yankton	1,234	52	58	.....	.....	.....	21.4	+ 7.2	58	20	34	—19	30	9	42	.....	.....	.....	0.18	— 0.4	3	7,762	w.	39	nw.	25	12	11	8	4.8	1.1
Northern Slope.							21.2	+ 4.2											0.76	+ 0.1										5.7	
Havre	2,494	46	47	27.26	30.05	— .10	14.2	+ 4.5	48	20	23	—21	2	5	40	14	11	84	0.77	— 0.1	10	10,462	sw.	45	sw.	18	7	9	15	6.3	7.7
Miles City	2,372	41	49	27.41	30.06	— .12	18.8	+ 8.2	50	20	28	—17	30	10	37	16	12	81	1.60	+ 0.2	13	5,721	sw	42	sw.	22	3	6	12	6.0	5.2
Helena	4,108	88	93	25.76	30.16	+ .04	22.3	+ 5.2	49	21	30	—18	4	14	34	19	13	67	0.55	0.0	8	6,090	w.	39	w.	25	6	12	13	6.0	5.2
Rapid City	3,251	46	50	26.51	30.06	— .11	21.2	+ 1.0	57	21	33	—13	30	9	40	17	10	69	0.33	0.0	8	5,605	nw.	36	nw.	22	3	6	22	7.6	26.4
Cheyenne	6,084	58	60	23.84	30.14	— .03	25.3	+ 0.3	55	10	36	— 6	31	14	45	21	5	45	1.23	+ 0.9	9	11,706	nw.	60	w.	4	10	11	10	5.1	12.3
Lander	5,372	28	36	24.51	30.14	— .07	21.4	+ 4.6	54	21	37	—16	1	6	53	17	9	63	0.88	+ 0.1	3	3,177	sw.	35	w.	21	7	15	9	5.6	8.8
North Platte	2,826	43	52	27.02	30.13	— .06	25.5	+ 5.5	62	21	40	— 8	30	11	41	18	11	63	0.11	— 0.4	4	6,593	nw.	46	nw.	23	15	11	5	4.0	1.8
Middle Slope.							31.0	+ 3.0										67	0.39	— 0.5										4.6	
Denver	5,290	79	151	24.60	30.12	— .05	30.4	+ 2.2	58	21	44	— 5	31	17	55	24	11	50	0.65	+ 0.1	7	6,731	s.	50	ne.	22	18	7	6	3.8	8.5
Pueblo	4,682	74	81	25.21	30.12	— .06	28.2	— 0.5	59	21	42	—12	31	14	47	22	14	60	0.46	+ 0.1	5	5,165	nw.	42	w.	3	11	18	7	4.7	5.3
Concordia	1,398	42	47	28.57	30.14	— .06	29.0	+ 5.8	62	21	39	— 8	30	19	36	24	21	78	0.03	— 0.8	1	6,066	s.	28	n.	28	10	16	5	4.8	0.3
Dodge	2,504	44	52	27.39	30.13	— .03	31.6	+ 5.0	61	21	45	— 8	31	18	46	24	19	69	0.08	— 0.4	3	8,052	nw.	41	se.	11	13	12	6	4.8	1.1
Wichita	1,351	78	85	28.64	30.14	.00	31.6	+ 1.0	65	21	41	— 6	31	22	36	27	22	72	0.38	— 0.7	4	7,190	s.	45	n.	23	13	9	9	4.8	1.1
Oklahoma	1,218	54	62	28.79	30.14	— .01	35.4	+ 4.3	66	22	46	0	31	25	34	31	26	78	0.73	— 1.2	8	7,998	s.	40	n.	23	17	5	9	4.4	3.2
Southern Slope.							38.1	+ 0.3										66	0.40	— 0.4										6.4	
Abilene	1,749	45	54	28.25	30.15	— .02	42.4	— 0.4	72	12	54	8	31	31	40	34	26	59	0.51	— 0.4	6	8,120	sw.	39	nw.	23	9	14	8	5.0	0.1
Amarillo	3,691	54	61	26.22	30.14	— .01	33.8	+ 1.9	59	22	45	— 3	31	23	42	29	24	74	0.29	— 0.3	5	11,787	n.	72	n.	23	19	9	3	3.0	2.8
Southern Plateau.							43.3	+ 0.5										47	0.42	— 0.3										2.2	
El Paso	3,767	10	110	26.19	30.11	+ .02	44.5	0.0	70	28	59	20	24	30	41	33	17	40	0.06	— 0.5	2	7,808	nw.	51	nw.	30	22	7	2	2.2	
Santa Fe	6,998	47	50	23.18	30.16	+ .02	26.6	— 1.3	48	30	36	9	24	17	30	21	10	55	0.19	— 0.4	5	5,290	ne.	36	n.	23	25	4	2	2.3	2.4
Flagstaff	6,885	12	25	23.33	30.25	.....	25.8	.....	51	28	40	— 5	13	12	50	.....	.....	.....	1.83	.....	5	.....	sw.	.....	.....	.....	.....	.....	17	5	9	3.0	13.3
Phenix	1,076	47	57	28.91	30.07	+ .01	50.4	+ 1.0	73	31	63	27	6	37	33	41	28	49	1.28	+ 0.7	3	2,761	e.	30	n.	22	21	4	6	2.9	
Yuma	139	16	50	29.90	30.05	.00	55.0	+ 0.9	81	28	68	31	2	42	41	44	28	40	0.01	— 0.4	1	4,669	n.	29	n.	22	24	7	0	1.5	
Independence	3,907	10	58	26.06	30.13	.00	40.2	+ 1.8	68	28	51	12	4	29	37	33	20	49	0.54	— 0.7	5	6,549	nw.	48	se.	2	24	4	3	2.3	6.8
Middle Plateau.							34.5	+ 5.6										68	1.37	— 0.3										6.4	
Carson City	4,720	82	92	25.33	30.21	+ .05	35.8	+ 3.9	62	21	48	— 3	5	24	34	30	22	61	1.94	— 0.6	9	4,541	sw.	60	sw.	1	7	15	9	5.1	23.7
Winnemucca	4,340	59	70	25.72	30.22	+ .04	34.0	+ 7.0	55	31	43	3	13	25	29	30	26	76	1.32	+ 0.2	11	7,896	sw.	72	sw.	31	5	8	18	7.1	11.0
Salt Lake City	4,344	83	90	25.69	30.22	— .01	33.8	+ 5.9	54	31	40	16	13	28	21	30	22	64	0.84	— 0.6	8	4,449	se.	36	s.	2	4	5	22	7.9	4.3
Grand Junction	4,608	43	50	25.45	30.34	.....	30.2	.....	48	2	32	— 2	15	8	42	17	12	73	0.42	.....	6	2,552	e.	37	s.	2	6	16	9	5.5	6.1
Northern Plateau.							30.6	+ 6.3										79	2.03	— 0.1										3.2	
Baker City	3,470	49	55	26.43	30.14	— .10	30.7	+ 7.9	51	26	37	5	4	24	22	27	24	77	1.46	— 0.2	18	3,948	s.	27	s.	1	3	5	23	8.5	11.4
Boise	2,736	61	68	27.33	30.17	— .06	35.8	+ 8.4	53	27	42	17	5	29	23	32	28	74	1.89	— 0.4	18	3,836	se.	36	w.	31	2	8	21	7.7	10.7
Idaho Falls	4,742	10	56	25.33	30.32	+ .09	22.8	+ 6.7	40	31	30	—19	5	16	34	22	20	86	0.70	— 1.3	10	8,677	s.	43	sw.	31	0	3	28	9.4	7.1
Spokane	1,943	99	107	27.95	30.09	— .02	27.3	+ 2.8	54	27	34	—21	4	20	32	26	24	86	3.81	+ 1.3	19	4,110	s.	31	e.	31	8	3	20	7.5	23.2
Walla Walla	1,018	65	73	28.99	30.12	— .04	36.4	+ 5.9	60	30	42	— 4	4	30	27	32	27	73	2.30	— 0.1	19	4,839	s.	32	sw.	21	1	11	19	7.8	7.9
N. Pac. Coast Reg.							41.0	+ 1.9										89	11.33	+ 3.0										8.7	
Port Canby	179	10	34	29.83	30.03	+ .01	42.2	+ 1.3	50	*	45	30	*	39	11	42	41	93	15.48	+ 7.0	28	13,447	e.	72	s.	13	0	2	29	9.5	0.2
Neah	50	7	34	29.91	29.97	— .05	40.0	— 0.7	53	20	43	24	4	37	13	40	39	95	21.62	+ 6.3	27	6,950	e.	36	w.	21	0	1	30	9.6	16.5
Port Crescent	256	15	20	.....	.....	.....	37.0	+ 1.5	55	20	42	9	4	32	21	.....	.....	.....	8.46	+ 1.4	23	2,738	sw.	48	se.	13	0	8	23	8.5	34.0
Pysht	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seattle	119	114	121	29.89	30.02	— .01	40.9	+ 1.9	55	17	44	16	4	38	11	39	37	86	6.10	+ 0.8	23	5,004	se.	34	sw.	31	1	3	27	8.7	17.0
Tacoma	213	113	120	.....	.....	.....	40.4	+ 2.4	55	17	44	14	4	36	20	.....	.....	.....	9.17	+ 2.8	23	5,255	sw.	39	s.	14	1	4	26	9.0	14.5
Astoria	.....	18	.....	.....	.....	.....	43.2	+ 2.7	56	17	47	29	3	39	14	.....	.....	.....	18.84	+ 8.3	27	.....	e.	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Oreg	153	203	213	29.91	30.08	— .01	40.6	+ 2.2	58	15	45	20	6	36	18	39	37	85	6.42	— 0.7	21	7,024	s.	48	s.	2	0	6	25	8.7	11.6
Roseburg	521	56	67	29.52	30.10	— .02	44.1	+ 3.8	62	20	50	32	3	38	21	42	40	84	4.57	— 1.6	20	2,605	s.	30	w.	31	4	11	16	7.1	T.
Mid. Pac. C'st Reg.							49.9	+ 2.8										76	6.10	+ 0.5										6.3	
Eureka	64	60	69	30.06	30.12	+ .03	47.5	+ 1.2	61	26	53	34	3	42	25	46	43	84	6.50	— 2.0	18	4,333	se.	39	se.	9	6	7	18	6.9	
Mount Tamalpais	2,375	11	18	27.62	30.13	.....	47.8	.....	69	26	52	32	3	44	26	42	34	70	5.92	.....	14	17,821	nw.	86	w.	10	8	9	14	6.0	T.
Red Bluff	334	54	58	29.78	30.14	+ .01	48.8	+ 3.9	77	27	56	30	5	41	30	44	38	73	9.29	+ 4.6	13	5,807	n.	36	se.	1	10	6	15	6.0	
Sacramento	71	106	117	30.05	30.13	+ .01	49.0	+ 3.4	72	30	56	31	5	42	25	46	41	75	3.94	+ 0.1	12	7,559	se.	48	se.	10	10	6	15	6.8	
San Francisco	153	161	167	29.98	30.14	+ .03	53.0	+ 2.9	78	26	58	40	4	48	22	49	46	80	3.67	— 1.1	11	5,864	se.	47	sw.	10	5	11	15	6.7	
Point Reyes Light	.....	12	.....	.....	.....	.....	51.0	+ 2.4	74	29	56	38	8	46	22	.....	.....	.....	7.11	+ 1.0	15	10,140	nw.	75	se.	10	10	6	15	6.1	
S. Pac. Coast Reg.							53.9	+ 3.3										63	3.12	+ 0.4										4.0	
Fresno	332	67	70	29.79	30.14	+ .01	50.0	+ 5.5	68	31	57	29	5	41	28	46	42	80	1.92	+ 0.6	7	2,693	nw.	19	s.	10	9	6	16	5.8	
Los Angeles	330	74	82	29.71	30.07	+ .01	55.8	+ 2.7	82	22	66	37	3	45	32	48	41	65	2.64	— 0.3	4	2,644	w.	30	e.	10	16	8	7	3.8	
San Diego	87	94	102	29.97	30.07	.00	55.5	+ 1.9	74	19	62	43	13	49	21	48	40	63	2.34	+ 0.3	7	3,779	nw.	33	se.	10	25	3	3	2.7	
San Luis Obispo	201	10	46	29.92	30.14	+ .05	54.2	+ 3.1	81	26	65	29	1	43	41	47	40	63	5.56	+ 0.9	7	4,527	n.	32	se.	10	18	4	9	3.5	
West Indies.																															
Basseterre	29	41	54	29.99	30.02	.....	75.8	.....	82	2	80	68	14	71	13	70	67	76	3.86	.....	26	8,085	e.	26	e.	25	9	13	9	5.3	
Bridgetown	30	57	65	29.93	29.96	.....	76.9	.....	84	3	82	69	29	71	14	69	68	81	2.82	.....	23	6,632	ne.	28	e.	24	0	22	9	6.4	
Colon	25	.....	.....	29.79	29.82	.....	78.8	.....	86	6	83	70	24	74	14	75	74	87	6.36	.....	23	4,946	ne.	16	ne.	2	2	14	15	7.3	
Kingston	286	38	52	29.66	29.97	.....	76.0	.....	87	25	84	64	21	68	22	68	66	79	1.17	.....	12	4,637	ne.	25	se.	23	4	16	11	6.1	
Port of Spain	40	65	66	29.87	29.91	.....	77.1	.....	86	21	84	67	26	70	18	70	68	79	2.20	.....	15	3,229	ne.	18	n.	15	5	21	5	5.5	
Roseau	25	38	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan	82	109	117	29.95	30.03	.....	74.6	— 0.7	82	28	80	66	19	69	13	69	68	83	2.92	0.0	23	5,327	e.	22	e.	14	22	9	0	3.1	
Santiago de Cuba	82	45	51	29.89	29.97	.....	77.4	.....	90	31	86	64	18	68	22	68	66	78	0.45	.....	5	3,709	ne.	20	ne.	4	23	7	1	2.9	
Santo Domingo	59	82	88	29.98	30.04	.....	74.0	.....	86	30	82	61	22	66	22	68	67	87	3.04	.....	16	3,125	n.	17	e.	6	12	17	2	4.3	
Willemstad	75	39	46	29.83	29.90	.....	77.9	.....	84	12	82	68	15	73	13	71	69	78	2.54	.....	11	9,183	e.	25	e.	15	12	17	2	4.2	
Alaska.																															
Sitka	90	4	22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more dates. †Received too late to be considered in departures, etc.

TABLE II.—*Climatological record of voluntary and other cooperating observers, January, 1899.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco	74	20	49.6	4.65	
Ashville	67	18	42.2	4.82	
Bermuda	71	26	49.6	6.70	2.0
Birmingham	66	21	46.2	5.26	
Bridgeport				5.96	
Citronelle	69	27	50.5	6.03	
Clanton	66	23	44.0	1.75	4.0
Decatur	65	12	41.4	6.36	T.
Demopolis				6.69	
Eufaula[a]	74	25	47.0	6.06	1.0
Eufaula[c]				5.41	T.
Evergreen	72	26	48.0	4.14	3.5
Florence[a]				6.02	1.0
Florence[b]	64	13	40.4	5.96	0.5
Gadsden		19		4.42	T.
Goodwater[a]	70	20	42.8	5.21	
Greensboro	67	19	44.5	6.44	1.0
Hamilton				6.59	T.
Healing Springs	73	19	47.2	5.98	3.
Highland Home	71	27	47.2	6.04	5.
Jasper	58	19		6.10	
Lock No. 4	65	20	41.4	3.79	0.8
Madison Station	66	10	38.4	6.26	T.
Maplegrove	67	17	41.2	4.53	1.0
Marion	66			6.40	4.0
Mount Willing				6.90	
Newbern	66	24	46.0	6.72	3.8
Newburg	63	10	39.8	6.66	T.
Newton	73	24	46.4	9.97	
Oneonta	64	11	40.8	6.14	T.
Opelika	66	22	45.0	7.41	3.0
Oxanna	64	21	42.8	4.36	2.0
Pineapple	70	25	47.3	3.00	0.5
Pushmataha		20		7.37	2.5
Riverton	63°	12°	38.9°	5.50	0.2
Rockmills	68	22	43.0	6.34	3.5
Scottsboro	66	14	40.3	6.52	T.
Selma	69	25	47.4	5.34	5.0
Sturdevant				5.71	7.0
Talladega	67	21	44.0	3.84	0.2
Tallassee				6.62	2.0
Thomasville	70	21	45.9	1.77	6.0
Tuscaloosa	66	20	42.9	8.14	
Union	81	21	49.6	8.55	
Union Springs	72	25	45.0	6.85	3.5
Uniontown	70	26	47.4	6.05	3.8
Valleyhead	62	15	40.2	5.48	
Warrior				8.10	
Wetumpka	68	25	46.8	6.95	3.0
Wilson[*1]	72	26	50.4	5.44	T.
Wilsonville				3.45	0.2
Alaska.					
Juneau	44	4	27.4	4.22	34.0
Killisnoo	40	11	29.4	6.41	38.5
Skaguay	40	— 4	22.2	0.94	12.5
Arizona.					
Allaire Ranch				0.34	
Arizona Canal Co. Dam	74	28	50.9	1.05	
Aztec				0.03	
Bisbee	67	26	44.0	0.52	T.
Blaisdell[*5]	82	28	55.4	0.02	
Buckeye	78	22	52.4	1.50	
Casa Grande[*1]	71	32	55.0	0.90	
Champie Camp	76	28	51.4	2.00	6.0
Congress	69	33	49.6	2.03	
Dragoon				1.63	
Dragoon Summit[*5]	65	25	50.2	1.02	
Dudleyville	71	22	46.1	1.60	
Fort Apache	59	6	31.2	1.33	9.7
Fort Defiance	45	—12	20.0	0.80	8.0
Fort Grant	77	22	46.6	0.74	
Fort Huachuca	67	20	43.5	0.52	
Fort Mohave	81	22[1]	49.6[e]	0.95	
Gilabend[*1]	72	32	50.2	0.80	
Holbrook	48	1	22.0	0.40	4.0
Hot Springs	72	33	50.9	2.05	
Ingleside	78	27	50.8	0.89	
Jerome	60	22	39.8	1.40	14.0
Lochiel[*2]	68	24	41.0	0.56	
Maricopa[*1]	88	26	53.9	0.75	
Mesa	69	27	48.2	1.26	
Mount Huachuca	63	19	41.3	0.91	1.2
Music Mountain	71	15	43.2	0.40	
Natural Bridge				2.17	15.0
Oracle	70	25	44.0	2.35	4.0
Oro				0.40	
Oro Blanco	66	26	46.4	1.90	7.0
Pantano[*1]	70	33	46.4	1.39	
Parker	85	22	52.6	0.16	
Peoria	67	27	46.8	1.61	
Phenix	77	23	47.8	1.20	
Pima	73	15	43.2	0.22	
Pinal Ranch				2.30	
Prescott	63	— 6	35.6	0.97	9.5
San Carlos	72	17	44.0	1.80	
San Simon[*1]	68	17	38.5	0.42	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sentinel				0.60	
Signal	88	24	47.8	0.87	
Snowflake	53	3	26.7	0.42	6.0
Strawberry	57	— 7	28.6	1.80	18.0
Texas Hill[*1]	80	25	50.6	0.15	
Tombstone	67	23	44.5	0.33	T.
Tuba	55	6	27.4	0.04	0.7
Tucson	74	20	46.6	0.78	
Walnut Grove				2.30	23.0
White Hills	69	18	45.8	0.30	
Willcox[*1]	58	18	42.7	0.52	
Williams	52	— 1	29.2	1.40	14.0
Yarnell				1.10	13.0
Arkansas.					
Amity	65	11	40.2	8.79	1.2
Arkansas City				5.35	
Blanchard Springs	75	14	43.8	3.43	
Brinkley	65	5	41.4	9.30	2.0
Camdena				4.18	T.
Camden[b]	70	15	42.8	3.66	T.
Canton[*1]	57	1	34.7		
Conway	70	5	40.0	7.04	5.0
Corning	63	— 9	35.4	6.69	6.0
Dallas	63	7	39.6	5.14	2.0
Dardanelle				4.55	0.5
Elon	74	4	44.6	4.48	T.
Fayetteville	63	— 2	36.0	3.04	3.2
Fulton				9.34	
Hardy	60	— 1	35.8	4.83	2.8
Helena[a]				5.60	1.5
Helena[b]	71	14	44.0	4.79	1.0
Hot Springs[a]	65	10	40.6	7.19	0.8
Hot Springs[b]				7.05	
Jonesboro	64°	3°	36.4°	8.35	7.0
Keesees Ferry	62	— 2	35.5	2.52	3.8
Lacrosse	61	— 1	34.4	2.20	T.
Lonoke[*1]	65	7	40.4	11.19	7.2
Luna Landing				5.83	
Lutherville[*1]	62	8	39.8		
Malvern	65	12	41.0	9.81	0.2
Marianna[*1]	63	10	41.0		
Marvell	66	8	42.2	7.22	1.0
Monticello	74	11	42.4	3.70	T.
Moore				6.90	1.
Mossville	59	0	33.2	5.16	4.0
Mount Nebo	57	2	36.0	5.05	7.0
New Gascony	68	11	41.8	6.88	1.0
Newport[a]				7.00	7.0
Newport[b]	67	3	38.4		
Newport[c]	65	3	39.0	7.15	6.5
Oregon	62	0	33.6		
Osceola	64	4	38.1	8.26	8.0
Ozark	62	8	38.8	3.73	2.0
Picayune	69	5	41.2	7.41	
Pinebluff	70	13	43.2	7.38	1.0
Pocahontas	61	0	34.6	6.79	
Pond	60	— 3	34.6	2.59	3.8
Powell	70	— 5	35.8	4.28	4.0
Prescott	67	15	42.9	8.40	0.5
Rison	71	13	41.9	5.91	0.5
Silver Springs	63	— 2	35.5	2.25	2.6
Spielerville	66	— 1	38.1	5.03	2.5
Stamps	70	19	43.2	6.23	T.
Stuttgart	67	8	40.4	7.98	2.3
Texarkana	70	14	47.2	5.90	0.5
Warren	74	15	43.2	4.89	0.5
Washington	65	15	41.8	9.86	1.9
Wiggs[*1]	63	8	41.9	7.90	3.5
Winslow	59	— 1	32.1	1.58	3.0
Witts Springs	59	— 3	34.8	4.57	2.8
California.					
Agnew	80	30	51.8	2.59	
Anada	70	18	39.5	13.03	17.0
Arlington Heights	80	29	52.8	2.09	
Azusa				3.59	1.0
Ballast Point L. H				2.50	
Bear Valley				11.95	80.0
Berkeley	77	36	51.6	5.90	
Bishop	73	8	39.8	1.65	15.0
Blue Lakes City	73	24	47.1	3.85	
Boca[*1]	52	— 2	25.5	6.80	68.0
Bodie†	44	—17	21.2	3.21	29.0
Bowmans Dam[*1]	61	11	35.2	14.11	83.0
Caliente[*1]	65	35	50.8	1.73	
Calloway	75	26	52.0	1.25	
Campbell	72	30	50.7	4.07	
Cape Mendocino L. H				7.10	
Cedarville	54	4	33.8	1.36	17.5
Centerville[*1]	80	38	55.4	2.78	
Chico[*1]	78	30	49.6	7.17	
Chino				3.24	
Cisco[*1]	46	8	30.1	10.70	101.0
Claremont	78	30	50.2	2.70	
Corning[*1]	73	30	45.2	8.13	
Coronado	70	49	57.7		
Craftonville	81	31	54.8	1.88	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Crescent City	67	33	48.0	11.06	
Crescent City L. H				10.28	
Cuyamaca	61	10	37.2	7.02	13.0
Delano[*1]	70	30	46.5	0.68	
Delta[*1]	69	25	40.9	8.19	41.0
Drytown	74	30	50.0	4.32	
Duarte	74	35	53.5	2.20	
Dunnigan[*1]	75	33	49.0	7.00	
Durham[*1]	75	30	48.3	6.33	
East Brother L. H				2.95	
Edmanton[*1]	60	16	35.0	13.12	81.0
Elsinore	86	25	52.2	3.43	
Escondido	74	21	48.7	3.23	
Fallbrook[*1]	80	36	52.6	3.51	
Floriston				2.25	22.5
Folsom City[*1]	74	33	49.8	4.88	
Fordyce Dam				10.84	87.0
Fort Bragg				9.98	
Fort Ross	83	35	51.8	20.83	
Fort Tejon				2.57	
Georgetown	70	23	44.6	8.59	1.5
Gilroy Hot Springs				5.53	
Glendora				2.10	
Goshen[*5]	70	28	48.8	1.25	
Grand Island[*5]	74	33	50.4	4.47	
Grass Valley				10.76	5.5
Greenville	65	11	34.8	6.71	51.5
Healdsburg[*1]	82	30	49.9	15.33	
Hill Ranch	91	29	55.5	2.92	
Hollister	80	28	50.5	2.35	
Humboldt L. H				6.33	
Hydesville	65	31	47.8	8.08	
Indio[*1]	86	25	54.3	0.40	
Iowa Hill[*1]	70	29	46.0	6.93	4.0
Irvine	88	40	60.7	3.82	
Jackson	68	25	45.6	5.20	1.0
Jolon				4.55	
Keene[*1]	62	25	43.3	0.41	
Kennedy Gold Mine	66	24	43.7	4.43	
Kernville				2.10	
King City[*1]	72	32	43.3	3.00	
Kingsburg[*5]	65	28	48.3	1.46	
Kono Tayee	75	35	47.0	7.74	
Lagrange[*5]	70	32	50.6	2.51	
Lakeside				3.29	
Lamesa				3.12	
Laporte[*1]	60	12	35.9	12.95	114.1
Las Fuentes Ranch				3.97	
Lemoncove[d]	73	30	49.4		
Lemoore[a*1]	68	28	46.4	0.76	
Lick Observatory	65	24	42.5	5.63	19.9
Lime Point L. H				4.53	
Lodi	67	31	48.9	3.42	
Los Alamos				3.12	
Los Gatos[b]	72	35	50.0	7.82	
Malakoff Mine	77	20	43.6	10.88	36.0
Mammoth Tank[*1]	80	35	54.6	0.01	
Manzana	72	26	45.8	1.15	T.
Mare Island L. H				3.61	
Merced[*1]	69	33	49.6	2.18	
Mills College				4.49	
Milo				2.38	
Milton (near)[*1]	66	32	48.0	4.65	
Modesto[*1]	80	34	51.2	2.51	
Mohave[*1]	70	25	45.9	0.37	
Mokelumne Hill[*5]		30	44.0	4.52	
Monterey[*1]	72	31	53.3	2.79	
Morena Dam				3.73	
Mountain View				3.15	
Mount Frazier				1.97	17.5
Multah Flat				2.30	
Napa[b]	83	32	51.8	6.17	
Needles	73	29	54.5	0.58	
Nevada City	72	21	42.8	9.12	10.0
Newhall[*1]	80	22	49.7	2.77	
North Ontario	76	29	50.8	2.88	
North San Juan[*1]	80	28	44.7	10.25	2.0
Oakland[a]	77	36	51.0	5.59	
Ogilby[*1]	75	30	50.4	0.00	
Oleta[*1]	71	27	44.2	5.29	
Orland[*1]	78	32	50.0	6.98	
Palermo	74	27	48.4	5.45	
Paso Robles[b]	71	28	49.0	4.16	
Peachland[*5]	80	34	51.9	16.16	
Piedras Blancas L. H				8.51	
Pigeon Point L. H				2.33	
Pilot Creek				10.81	42.0
Pine Crest	76	40	56.2	4.49	
Placerville	72	24	43.8	5.62	T.
Point Ano Nuevo L. H				3.24	
Point Arena L. H				8.12	
Point Bonita L. H				5.96	
Point Conception L. H				3.84	
Point Firmin L. H				2.10	
Point George L. H				4.65	
Point Hueneme L. H				5.59	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Point Lobos	74	40	51.2	4.93	
Point Loma L. H.	.....	.....	.....	1.82	
Point Montara L. H.	.....	.....	.....	6.20	
Point Pinos L. H.	.....	.....	.....	4.95	
Point Sur L. H.	.....	.....	.....	4.83	
Pomona (near)	79	31	52.8	2.79	
Poway[*3]	78	29	47.0	2.98	
Quincy	50	15	34.3	8.75	45.0
Ranch House	81	38	57.8	3.10	
Redding *b*	75	25	45.6	9.66	25.0
Redlands	82	32	53.4	1.92	
Represa	78	28	49.4	5.41	
Rio Vista	76	31	49.3	4.21	
Roe Island L. H.	.....	.....	.....	3.09	
Rosewood	76	20	43.0	9.51	21.0
Sacramento *a*	72	31	49.3	4.44	
Salinas[*1]	72	27	50.6	3.94	
Salton[*1]	87	29	51.9	0.30	
San Bernardino	81	25	52.7	2.03	
San Leandro[*1]	87	38	56.5	3.68	
San Luis L. H.	.....	.....	.....	3.89	
San Mateo[*1]	73	37	51.6	4.21	
San Miguel[*1]	71	28	46.6	3.09	
San Miguel Island	76	37	53.4	4.25	
Santa Barbara *a*	78	37	54.8	4.48	
Santa Barbara L. H.	.....	.....	.....	4.41	
Santa Clara *a*	.....	.....	.....	2.68	
Santa Cruz *b*	81	31	51.8	7.27	
Santa Cruz L. H.	.....	.....	.....	6.88	
Santa Maria	82	34	55.0	3.49	
Santa Monica[*1]	78	35	53.7	4.03	
Santa Paula	79	32	51.4	3.44	
Santa Rosa[*1]	74	31	52.8	8.77	
Shasta	76	19	45.7	12.42	47.0
Sierra Madre	76	36	53.6	3.21	
Sneddens Ranch	.....	.....	....	2.65	
Sonoma	.....	.....	.....	7.76	
S. E. Farrallone L. H.	.....	.....	.....	6.73	
Stanford University	74	30	50.2	0.63	
Stockton *a*	68	30	48.3	3.15	
Summerdale	56	14	36.0	7.96	41.0
Susanville	53	13	33.1	2.90	33.0
Sutter Creek[*5]	62	22	40.1	3.47	
Tehama[*1]	76	34	50.6	6.11	
Tejon Ranch	72	32	49.8	1.05	
Templeton[*1]	78	26	48.0	4.23	
Thermalito	76	28	49.5	6.34	
Trinidad L. H.	.....	.....	.....	7.19	
Truckee[*1]	48	0	29.1	7.80	78.0
Tulare *b*	.....	.....	.....	1.08	
Tulare *c*	78	26	49.4	0.92	
Ukiah	77	28	46.8	10.54	
Upperlake	84	29	47.0	8.16	
Vacaville *a*[*1]	78	34	51.6	7.11	
Ventura	82	29	51.4	4.89	
Visalia[*1]	78	26	44.9	1.54	
Volcano Springs[*1]	82	30	53.6	0.00	
Walnut Creek	80	32	53.7	4.04	
West Palmdale[*1]	73	22	44.5	1.00	
Westpoint	.....	.....	.....	6.06	7.0
West Saticoy	.....	.....	.....	3.92	
Wheatland	72	29	47.0	4.38	
Williams[*1]	75	36	51.0	4.77	
Wilmington[*1]	80	40	58.6	2.31	
Wire Bridge[*5]	75	27	46.8	6.22	
Yerba Buena L. H.	.....	.....	.....	3.05	
Yreka	59	13	36.5	2.75	.....
Yuba City[*5]	75	34	52.6	5.07	
Colorado.					
Antlers	45	2	23.6	1.13	17.4
Arkins	.....	.....	.....	0.63	11.8
Boulder	56	— 3	31.6	0.87	13.0
Boxelder	.....	.....	.....	1.27	17.0
Breckenridge	42	—21	11.8	4.75	80.2
Canyon	60	— 7	34.2	0.34	3.5
Castlerock	52	—11	24.0	0.63	9.5
Cedaredge	49	—12	24.6	0.46	7.2
Cheyenne Wells	61	—17	26.2	0.42	4.2
Collbran	.....	.....	.....	0.73	10.8
Colorado Springs	54	— 8	26.6	0.23	4.6
Cope	57	—15	27.6	0.51	8.0
Delta	44	— 7	21.6	0.60	9.5
Dumont	.....	.....	.....	0.60	9.5
Durango	46	— 8	19.7	1.63	22.8
Fairview	49	— 6	24.0	0.18	3.0
Fort Collins	55	—17	25.0	0.66	11.2
Fort Morgan	47	—16	20.6	0.56	8.0
Fox	.....	.....	.....	0.53	8.0
Garnett	32	—30	3.2	T.	T.
Georgetown	45	— 2	24.6	.....	.....
Gleneyrie	52	— 5	27.6	.....	.....
Greeley	50	—19	20.5	1.14	20.5
Gunnison	42	—36	6.6	0.51	8.5
Hamps	51	—14	22.8	0.90	12.0
Hoehne	55	— 5	28.8	0.26	4.0
Holly	.....	.....	.....	0.05	1.0
Holyoke	.....	.....	.....	0.45	4.5
Holyoke (near)	62	—12	26.6	0.32	5.0
Hugo	.....	.....	.....	0.79	10.0
Husted	56	— 9	27.0	0.33	4.5
Lake Moraine	41	— 5	18.0	0.85	19.2
Lamar	57	—12	28.8	0.27	4.0
Laporte	.....	.....	.....	0.89	13.0
Las Animas	56	—12	27.4	0.48	6.0
Leadville (near)[*1]	35	— 5	17.6	2.98	61.2
Leroy	63	— 8	29.1	0.50	7.2
Longs Peak	46	— 7	21.6	0.54	7.2
Loveland	.....	.....	.....	0.80	12.0
Mancos	44	— 8	21.2	0.71	9.5
Meeker	52[c]	—20	21.5	0.90	13.2
Minneapolis	60	—18	30.2	0.19	4.0
Moraine	44	4	23.4	0.77	12.0
Pagoda	50	—17	21.4	2.04	25.0
Parachute	50	— 3	26.4	0.96	15.0
Perry Park	.....	.....	.....	0.26	3.8
Rangely	.....	—20	.....	0.15	2.5
Rockyford	61	—20	27.4	0.98	13.0
Ruby	.....	.....	.....	5.19	78.0
Saguache	38	—23	11.4	0.22	3.5
Salida	54	— 9	27.2	0.02	0.5
San Luis	41	—21	14.0	0.08	1.9
Santa Clara[*1]	51	4	26.7	0.73	11.0
Seguro	45	— 9	17.9	0.35	5.0
Selbert	.....	.....	.....	0.71	9.5
Smoky Hill Mine	54	— 2	24.8	1.20	18.0
Springfield	.....	.....	.....	0.25	5.0
Stamford[*1]	44	— 8	17.3	0.57	11.5
Strickler Tunnel	.....	.....	.....	1.99	37.8
Trinidad	.....	.....	.....	0.54	7.5
Troutvale	45	—35	8.4	0.52	11.0
T. S. Ranch	50	4	23.3	0.29	3.9
Vilas	.....	.....	.....	0.10	2.0
Wagon Wheel	42	—24	9.2	0.10	2.0
Walden	45	—18	18.8	1.17	19.2
Wallet	.....	.....	.....	0.26	3.0
Westcliffe	46	— 4	23.3	0.25	4.5
Wray	60	—10	26.5	0.63	8.0
Yuma	.....	.....	.....	1.38	21.0
Connecticut.					
Bridgeport	53	— 3	27.9	4.45	5.4
Canton	53	—14	23.8	3.17	1.0
Colchester	50	— 8	28.2	4.61	6.2
Falls Village	.....	.....	.....	3.20	6.8
Greenfield Hill	.....	.....	.....	4.48	7.7
Hartford *a*	45	—10	24.2	4.57	4.8
Hartford *b*	.....	.....	.....	5.16	7.0
Hawleyville	50[f]	—11	25.8[e]	3.70	8.0
Lake Konomoc	.....	.....	.....	5.14	.....
Middletown	51	— 8	28.0	4.96	7.8
New London	53	— 3	28.3	4.02	8.4
North Grosvenor Dale	50	—18	27.8	4.51	.....
Norwalk	51	—15	26.0	4.28	6.0
Pomfret	51	— 8	26.0	4.60	5.9
Southington	51	—10	26.6	4.03	6.0
South Manchester	.....	.....	.....	2.57	7.0
Storrs	50	—11	24.8	3.76	8.0
Voluntown	52	— 7	27.8	3.86	6.0
Wallingford	.....	.....	.....	5.02	.....
Waterbury	52	—15	25.0	3.82	3.5
West Cornwall	48	— 8	22.3	3.47	8.2
West Simsbury	.....	.....	.....	3.36	5.0
Winsted[*1]	48	—18	22.4	.....	.....
Delaware.					
Milford	65	6	39.2	3.81	.....
Millsboro	63	7	35.4	3.00	.....
Newark	54	— 1	30.2	3.89	9.5
Seaford	63	4	36.0	3.17	6.0
District of Columbia.					
Distributing Reservoir[*5]	52	0	33.3	3.41	.....
Receiving Reservoir[*5]	54	0	32.8	3.57	.....
West Washington	62	0	32.8	4.15	7.2
Florida.					
Archer	82	35	57.1	5.02	
Bartow	88	39	65.3	5.03	
Boca Raton	88	46	69.2	2.03	
Brooksville	80	37	59.2	6.08	
Carrabelle	75	33	53.9	1.00	
Clermont	83	42	62.2	5.27	
Crawfordville	79	29	51.4	2.81	
De Funiak Springs	79	25	51.4	7.82	
Earnestville	81	40	61.4	8.71	
Estero[*1]	82	47	69.0	.....	
Eustis	82	39	60.7	5.15	
Federal Point	80	37	56.4	3.35	
Fort Meade	82	37	63.0	4.67	
Gainesville	79	38	56.4	3.81	
Grasmere	.....	39	.....	4.83	
Haywood	.....	.....	.....	5.05	
Homeland	.....	38	.....	.....	
Huntington	78	40	57.0	4.54	
Jasper	77	36	54.6	5.75	
Kissimmee	82	40	62.8	5.72	
Lake Butler	80	36	56.6	4.85	
Lake City	81	36	56.3	4.18	
Lakemont	85	41	65.0	4.03	
Lemon City	83	48	69.6	3.30	
Liveoak	.....	35	.....	5.69	
Macclenny	81	34	54.5	4.59	
Manatee	88	42	62.3	5.34	
Merritts Island	79	46	62.0	5.60	
Myers	82	43	65.0	5.21	
New Smyrna	80	39	58.6	4.33	
Ocala	83	35	58.9	5.63	
Orange City	83	36	60.6	4.08	
Orange Park	78	37	54.8	2.60	
Orlando	81	42	61.4	5.04	
Plant City	88	40	63.2	5.17	
St. Andrews	73[j]	30	53.4[e]	4.38	
St. Francis	82	35	59.2	4.99	
St. Francis Barracks	79	40	55.0	2.70	
Sebastian	80	46	64.8	6.30	
Switzerland[*1]	79	37	54.5	2.77	
Tallahassee	74	32	53.7	3.54	
Tarpon Springs	82	41	61.6	4.46	
Wausau	78	28	52.0	3.55	
Georgia.					
Adairsville	62	19	40.4	3.55	1.5
Albany	77	27	50.4	6.70	
Allentown	73	25	47.5	6.38	T.
Americus	74[d]	26[d]	47.9[d]	6.05	T.
Bellville	76	26	47.2	5.92	
Blakely	75	31	50.0	6.14	T.
Canton	.....	.....	.....	4.34	3.0
Cartersville	66	17	42.2	4.00	2.0
Cedartown	64[e]	18[e]	41.2[e]	3.22	2.0
Clayton	61	17	40.9	5.31	3.0
Covington	68	20	41.0	8.06	1.5
Crescent	65	30	45.0	4.92	
Dahlonega	65	16	40.6	4.64	2.0
Diamond	60	15	39.1	4.03	1.3
Dublin	.....	.....	.....	5.98	
Elberton	66	23	43.4	7.01	2.5
Fitzgerald	75	27	49.2	6.95	
Fleming	78	26	50.4	4.10	
Fort Gaines	72	.....	.....	9.98	
Franklin	67	24	45.4	6.25	1.0
Gainesville	72	21	41.3	4.11	3.0
Gillsville	.....	.....	.....	4.28	
Greenbush	62	16	39.6	3.77	T.
Griffin	69	22	45.9	.....	
Harrison	72	24	45.9	5.74	2.5
Hephzibah[*6]	78	30	47.6	4.50	2.0
Jesup	79	28	49.4	3.70	
Lagrange	68	23	45.2	3.83	6.5
Lumpkin	71	26	46.9	6.23	1.0
Marietta	64	20	41.1	4.25	1.7
Marshallville	74	27	44.9	6.22	1.0
Mauzy	78	28	52.2	3.57	
Millen	78	27	47.0	5.01	T.
Morgan	74	25	47.4	6.92	T.
Mount Vernon	72	28	48.0	6.70	
Newnan	.....	20	....	7.69	.....
Pelham	.....	.....	.....	4.39	
Piscola	75	32	52.4	3.20	
Point Peter	63	20	40.5	7.25	3.0
Poulan	76	26	48.6	6.68	
Putnam	66[f]	26[f]	45.0[f]	5.98	4.0
Quitman	77	29	51.1	5.29	
Ramsey	66	15	44.2	3.15	T.
Resaca	.....	.....	.....	3.98	0.6
Reynolds	.....	.....	.....	5.20	6.0
Rome	64	21	40.8	3.41	1.5
Talbotton	76	25	44.7	6.12	3.5
Tallapoosa	66	15	41.6	3.93	2.5
Thomasville	75	30	50.5	3.49	
Toccoa	64	21	41.6	6.37	2.0
Washington	.....	.....	.....	5.16	4.3
Waycross	77	31	50.8	5.45	
Idaho.					
American Falls	48	5	29.2	.....	.....
Atlanta	47	0	25.4	4.23	45.0
Blackfoot	47	— 8	26.5	0.13	1.0
Burnside	39	—15	19.6	1.10	16.0
Downey	46	0	26.2	0.61	.....
Fort Sherman	52	—15	25.0	5.01	22.6
Glmlet	53	—13	22.8	4.00	40.0
Gray	46	—10	23.8	3.00	30.0
Kootenai	38	—28	13.5	.....	.....
Lake	38	—16	15.8	6.50	65.0
Lakeview	53	3	29.5	5.00	25.5
Lewiston	60	1	35.8	0.99	.....
Lost River	41	—17	16.4	1.00	11.7
Marysville	54[e]	—19[e]	25.8[e]	2.02	20.2
Minidoka	47	—12	24.8	0.30	3.0
Moscow	50	—16	30.1	4.30	22.0
Murray	48	—19	26.0	6.95	54.0
Oakley	53	11	31.9	1.20	8.0
Ola	50	3	31.7	4.54	27.6

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Paris	45	− 5	24.4	0.84	11.2
Payette	52	10	34.0	1.90	10.5
Pollock	55	5	37.8	1.27	2.5
St. Maries	51	−16	29.6	5.48	31.2
Soldier	50	− 5	26.2	1.91	21.0
Swan Valley	46	− 8	25.7	1.61	21.1
Weston	48	− 8	29.9	1.32	11.0
Yellow Jacket	.....	.....	.....	1.67	.....
Illinois.					
Albion	59	− 5	31.8	4.42	2.5
Alexander	58	−11	28.0	0.96	5.5
Ashton	45	−17	21.2	0.48	2.7
Astoria	49	−11	26.0	0.89	5.3
Atwood *a* [2]	56	−15	33.9	.....	.....
Aurora *a*	48	−15	22.7	0.55	1.0
Aurora *b*	46	−14	22.3	0.72	2.0
Bloomington	50	−13	25.6	1.52	2.0
Bushnell	48	−13	25.6	0.66	2.0
Cambridge	46	−13	23.2	0.29	2.2
Carlinville	56	− 8	29.8	1.79	7.8
Carlyle	.....	.....	.....	2.79	4.5
Carrollton	52	− 8	28.4	1.35	4.8
Charleston	55	−10	27.6	2.97	4.8
Chemung	44	−20	18.6	0.76	5.0
Chester	.....	.....	.....	2.60	4.0
Cisne	62	− 5	31.6	3.54	2.5
Cobden	63	− 6	33.1	5.76	8.8
Danville	55	−10	27.9	2.68	7.5
Decatur	56	−12	27.4	1.89	8.3
Dixon	46	−16	21.7	0.30	1.0
Dwight	49	−14	22.6	0.80	1.8
Effingham	57	− 7	29.7	3.08	5.5
Elgin	46	−15	21.6	0.57	3.8
Equality	62	− 3	34.3	5.79	6.0
Flora	61	− 5	31.4	2.94	1.7
Fort Sheridan	40[1]	−15	20.0[e]	0.52	0.6
Friendgrove	.....	.....	.....	4.90	1.6
Galva	47	−18	22.4	0.24	2.0
Glenwood [e1]	48[e]	−15[e]	24.3[e]	0.89	6.0
Grafton	..	.....	.....	1.12	2.0
Grayville	60	0	34.2	4.37	4.0
Greenville	55	− 7	29.6	2.48	.....
Griggsville	53	−11	27.5	0.42	1.7
Halfway	60	− 4	32.8	4.46	4.0
Halliday [e2]	62	− 5	32.8	3.58	2.0
Havana	52	− 6	29.2	0.77	4.0
Henry	50	−15	24.4	0.33	.....
Joliet	48	−12	23.2	0.82	2.1
Kankakee *a*	48	−12	23.1	1.30	1.3
Kishwaukee	.....	−18	.....	0.43	1.7
Knoxville	48	−20	22.6	0.42	2.2
Lagrange	48	−13	22.6	0.37	2.0
Laharpe	56	−12	26.0	0.35	2.0
Lanark	44	−21	19.8	0.27	1.0
Loami	.....	.....	.....	0.93	3.5
McLeansboro	60	− 4	32.8	4.96	4.0
Martinsville	57	− 7	30.0	1.80	2.2
Martinton	51	−13	24.5	1.37	2.0
Mascoutah	60	− 5	31.6	2.70	5.2
Mattoon	56	− 6	28.5	2.29	4.5
Minonk	50	−14	23.4	0.50	3.2
Monmouth	48	−16	23.6	0.37	3.0
Morgan Park [d]	44	−14	24.8	0.29	.....
Morrisonville	54	−12	27.2	1.94	2.2
Mount Carmel	.....	.....	.....	4.93	7.1
Mount Pulaski	52	−11	26.8	1.21	10.0
Mount Vernon	60	− 5	30.4	3.26	4.0
New Burnside	61	− 4	34.2	5.36	8.0
Olney	61	− 5	31.2	3.98	5.5
Oswego	47	−15	22.4	0.73	1.8
Ottawa	46	−15	22.6	0.63	2.5
Palestine	57	− 5	28.0	3.74	3.8
Pana	53	−10	27.9	2.00	6.0
Paris	54	− 9	26.9	2.97	.....
Peoria *a*	.....	.....	.....	0.75	3.5
Peoria *b*	48	−11	26.6	0.72	2.0
Philo	55	−11	26.0	2.50	5.9
Plumhill	61	− 5	32.2	2.48	2.8
Rantoul	54	−14	24.9	2.23	4.2
Raum	61	− 4	33.9	6.78	6.0
Riley	44	−18	20.0	0.44	2.7
Robinson	57	− 5	30.5	3.77	2.5
Roundgrove	48	−20	21.6	0.30	1.3
St. Charles [e1]	44	−15	21.0	0.85	3.0
St. John	62	− 5	33.0	3.63	2.0
Savanna	55	.....	.....	0.24	3.0
Scales Mound	48	−21	18.0	0.48	4.7
Streator	50	−15	25.9	1.28	3.0
Sullivan	57	−11	27.8	2.27	6.5
Sycamore	44	−17	20.5	0.37	0.9
Tilden	60	− 6	31.7	2.16	1.5
Tiskilwa	44	−17	21.9	0.38	0.7
Tuscola	57	−11	26.2	1.90	4.8
Walnut	47	−15	23.6	0.36	1.1
Wheaton [e2]	.....	−10	20.2	0.74	3.8
Winchester	52	− 9	27.2	1.41	4.8
Winnebago	46	−18	20.5	0.53	4.0
Indiana.					
Anderson	55	− 8	28.4	3.23	5.8
Angola	51	−11	23.6	3.00	8.7
Auburn	52[f]	−10[f]	24.5[f]	2.08	3.0
Bedford	57	− 7	29.0	2.49	5.2
Bloomington	60	− 4	31.2	4.06	3.0
Bluffton	54	−11	27.1	2.60	4.5
Booneville	58	− 6	32.0	2.54	3.2
Bright	59	0	29.5	4.10	4.0
Butlerville	58	− 2	31.2	4.67	6.4
Cambridge City	56	− 7	28.9	3.42	1.7
Columbia City [e1]	50	− 8	24.9	2.70	6.5
Columbus	58	− 5	30.6	3.31	1.0
Connersville	56	− 4	28.8	3.09	0.8
Crawfordsville	59	−10	26.4	.....	.....
Delphi	56	−11	26.0	2.61	7.2
Edwardsville [e1]	61	0	34.1	4.78	7.7
Farmland	55	− 7	27.7	3.85	6.7
Fort Wayne	53	− 8	26.0	2.34	4.5
Franklin [e1]	56	− 3	30.8	3.32	2.0
Greensburg	54	−10	28.5	3.93	3.1
Hammond	44	−13	23.5	0.55	4.0
Hector	54	−10	29.2	2.93	1.0
Huntington	53	− 6	26.1	2.71	8.0
Jeffersonville	61	4	34.3	4.62	8.0
Knightstown	54	− 5	28.7	3.95	3.0
Kokomo	54	− 7	27.4	2.32	5.0
Lafayette	54	−14	25.6	2.42	6.2
Laporte	50	−10	23.2	2.06	5.7
Logansport *b*	53	− 8	25.5	2.30	4.5
Madison	60	3	33.2	4.18	7.0
Marengo	60	− 5	32.4	5.17	9.3
Marion	54	−11	27.1	3.13	6.0
Markle	53	− 6	27.5	2.90	6.0
Mauzy	55	− 7	29.2	3.59	4.0
Mount Vernon	62	− 7	32.4	4.84	6.1
Northfield	55	−10	27.4	2.95	5.0
Paoli	58	− 2	31.6	3.56	6.3
Peru	57	− 8	28.8	2.00	1.0
Princeton	59	− 3	31.4	.....	.....
Richmond	57	− 3	28.9	3.24	1.0
Rockville	56	−11	27.6	2.33	5.0
Scottsburg	60	0	33.0	3.43	6.5
Seymour	59	− 2	30.4	5.15	10.0
Shelbyville	.....	.....	.....	3.62	2.0
South Bend	52	−12	25.1	2.01	5.5
Syracuse	.....	.....	.....	2.67	7.8
Terre Haute	56	− 6	29.4	2.91	3.8
Topeka	50	− 9	23.6	0.99	2.2
Valparaiso	52	−14	21.4	.....	.....
Vevay	61	4	32.2	4.00	10.0
Vincennes	60	− 2	31.2	.....	.....
Washington	65	− 4	33.0	3.97	3.0
Winamac	54	− 2	26.5	2.49	2.0
Worthington [f]	58	− 5	30.0	3.99	3.1
Indian Territory.					
Healdton	67	1	40.0	1.60	2.0
Kemp	69	8	40.0	2.30	3.0
Lehigh	65	− 1	38.7	3.11	2.0
South McAlester	.....	.....	.....	3.34	0.9
Tahlequah	.....	.....	.....	2.24	2.0
Tulsa	.....	.....	.....	0.77	.....
Wagoner	57	− 5	30.8	1.76	2.3
Webbers Falls	.....	.....	.....	2.34	1.1
Iowa.					
Afton	49	−16	22.5	0.40	2.0
Albia	66	−16	25.2	0.71	5.5
Algona [e1]	42	−27	16.4	0.03	0.3
Alta *a*	47	−22	16.9	0.15	1.0
Amana	46	−17	20.3	0.36	0.5
Ames *b* [1]	44[e]	−18	20.1	0.11	0.1
Ames (near)	.....	.....	.....	0.05	T.
Atlantic	49	−16	22.1	T.	T.
Audubon	47	−17	20.6	.....	.....
Bedford	52	−18	23.8	0.26	1.5
Belknap	54	−14	24.4	0.50	2.0
Belleplaine	47	−19	19.6	0.82	5.5
Bonaparte	51	−15	25.0	0.05	0.5
Britt	43	−23	14.7	0.03	0.3
Burlington [1]	47	−20	24.6	.....	.....
Carroll	51	−22	18.2	T.	T.
Cedarfalls	44[e]	−19[e]	15.7[e]	0.50	1.0
Cedar Rapids	49	−17	21.4	0.53	4.0
Centerville	53[e]	−16[e]	25.9[e]	0.20	2.0
Chariton	51	−16	23.6	0.33	1.8
Charles City	40	−22	15.8	0.85	2.5
Clarinda	51	−17	23.4	0.24	2.0
Clear Lake	44	−22	12.6	0.32	3.0
Clinton	47	−17	21.2	0.27	0.5
College Springs	53	−17	25.0	0.12	2.0
Corning	51	−15	24.3	0.33	T.
Council Bluffs	68	−13	25.4	T.	T.
Cresco	37	−25	12.4	0.43	2.5
Decorah	40	−24	15.2	0.38	3.0
Delaware [e2]	46	−20	16.5	0.45	2.5
Denison	48	−19	17.3	0.05	0.5
Desoto	52	−17	23.2	0.10	1.2
Dows	42	−22	16.6	0.22	1.5
Eldon	.....	−14	.....	0.10	T.
Eldora	45	−22	17.2	1.15	4.0
Elkader	48	−22	17.2	0.44	3.5
Estherville	35[e]	−27[e]	10.8[e]	0.02	T.
Fairfield	63	−15	25.2	0.23	1.0
Fayette	41	−22	17.5	0.41	3.0
Forest City	40	−23	15.3	0.22	2.0
Fort Madison	.....	.....	.....	0.55	1.0
Galva	49	−19	20.4	0.15	1.5
Garden Grove	.....	−17	.....	0.20	0.5
Glenwood	57	−15	24.9	T.	T.
Grand Meadow [e1]	38	−22	15.9	0.62	4.2
Greene	40	−20	15.8	0.32	2.5
Greenfield	49	−19	22.0	0.49	1.1
Grinnell	45	−17	20.1	0.58	1.2
Grundy Center	45	−21	17.8	0.21	0.5
Guthrie Center	49	−17	19.8	T.	T.
Hampton	42	−21	15.8	0.27	1.5
Hawkeye	.....	.....	.....	0.80	5.0
Hedrick [e1]	45[f]	−14	20.1[e]	0.05	0.5
Hopeville	48	−15	23.2	0.15	0.6
Humboldt	44	−21	18.7	T.	T.
Independence [e2]	.....	−21	16.2	0.46	3.1
Indianola	47	−17	23.1	0.13	2.8
Iowa City *a*	48	−18	22.0	0.59	3.0
Iowa Falls	42	−21	16.9	0.10	T.
Keosauqua	53	−13	26.0	0.08	1.5
Knoxville	57	−15	23.1	T.	T.
Lamoni	49	−16	23.6	0.57	4.0
Lansing	46	−22	18.5	0.53	4.5
Larchwood	.....	.....	.....	0.17	1.8
Larrabee	47	−23	17.5	0.12	0.9
Lemars	51	−20	20.2	T.	T.
Lenox	47	−18	22.7	0.24	1.5
Logan [1]	47	−15	18.3	0.10	1.0
Maquoketa	47	−16	21.9	0.24	2.8
Mason City	45[e]	−34[1]	13.6[e]	T.	T.
Monticello	47	−18	19.7	0.47	2.8
Mooar	50	−14	26.2	T.	T.
Mountayr	49	−16	23.4	0.55	4.5
Mount Pleasant	53	−15	25.8	0.03	.....
Mount Vernon *a* [e1]	46	−20	20.3	.....	.....
Neola	45	−15	19.2	.....	.....
New Hampton	39	−23	15.8	0.43	4.0
Newton	48	−20	20.8	0.86	6.2
North McGregor	.....	.....	.....	0.39	7.0
Northwood	40	−23	14.3	0.00	0.0
Odebolt	49	−19	19.2	0.05	0.5
Ogden	48	−19	20.5	0.11	1.0
Olin	47	−17	19.5	0.39	2.0
Osage [e2]	.....	−26	15.6	0.41	3.0
Osceola	49[e]	−15[f]	21.0[e]	0.43	3.5
Oskaloosa [f]	51	−15	22.8	0.49	3.8
Ottumwa	54	−12	25.3	0.25	0.5
Ovid	51	−16	23.2	0.50	3.0
Parnell	56	−16	25.6	T.	T.
Pella	44	−17	16.2	0.32	2.0
Plover	45	−21	17.8	0.20	T.
Primghar	45	−24	17.5	0.00	0.0
Redoak	58	−13	24.8	0.15	.....
Ridgway	42	−25	16.6	1.05	4.2
Rock Rapids	44	−25	13.8	.....	.....
Rockwell City	47	−20	17.6	0.04	0.4
Ruthven	40	−24	16.4	T.	T.
Sac City	47	−19	18.4	0.04	0.5
Sibley	46	−24	16.6	0.20	0.5
Sidney	53	−16	23.0	0.17	1.0
Sigourney	51	−18	22.0	0.25	2.0
Spencer	45	−24	15.2	0.06	0.4
Spirit Lake	43	−25	15.0	T.	T.
Storm Lake	46[e]	−21[e]	19.0[e]	0.13	0.6
Stuart	43	−18	21.1	0.05	0.5
Tara	45	−23	19.0	T.	T.
Thurman	55	−14	24.6	0.12	2.7
Villisca	50	−15	21.6	0.10	1.0
Vinton [e1]	47	−16	20.2	0.53	3.0
Wapello [f]	58	−14	26.6	0.09	1.0
Washington	51	−16	21.6	0.16	T.
Washta	.....	.....	.....	0.10	1.0
Waterloo	47	−19	18.2	0.27	2.0
Waverly	43	−19	18.6	0.46	3.0
Webster City	45	−19	18.2	T.	T.
Westbend [e1]	43	−22	15.9	T.	T.
Westbranch	47	−14	20.8	0.11	0.5
Westunion	.....	.....	.....	0.15	1.5
Whatcheer [f]	45	−16	21.2	0.01	T.
Whitten [e1]	42	−19	17.9	0.02	T.
Wilton Junction	49	−17	22.4	T.	T.
Winterset	50	−15	22.3	0.26	2.6
Kansas.					
Abilene	61	−14	29.2	0.30	3.0
Achilles	.....	.....	.....	0.52	5.2
Altoona [e2]	57	− 2	29.2	0.65	5.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Anthony	.....	.....	.....	T.	T.
Atchison *a*	56	— 8	28.1	0.42	2.0
Atchison *b* *[1]	56	— 8	28.9	.....	.....
Augusta	65	— 6	32.1	0.21	T.
Burlington	62	— 8	30.8	0.37	3.5
Campbell	58	—10	27.9	0.05	0.5
Chanute	61	— 4	31.9	0.70	7.0
Colby	61	—18	27.8	0.31	3.3
Columbus	59	— 4	32.4	0.69	2.5
Coolidge	56	—10	27.2	0.20	2.0
Cunningham	66	—11	29.7	0.12	1.0
Delphos	62	—13	30.0	0.12	1.2
Ellinwood	62	— 8	28.8	0.23	2.0
Emporia	76	— 1	31.9	0.25	T.
Englewood	66	—16	31.0	0.10	1.0
Eureka Ranch	62	—14	27.7	0.25	2.5
Fallriver	66	— 2	33.5	0.56	2.5
Fanning	59	—12	29.0	0.37	3.0
Fort Riley	58	—10	27.6	0.65	2.0
Fort Scott	65	— 4	32.0	1.03	7.0
Frankfort	58	— 8	28.5	0.02	0.2
Garden City	61	—10	30.5	0.35	2.0
Gibson	64	—12	28.6	0.20	2.0
Gove *[1]	62	—10	28.8	0.35	3.5
Grenola	66	— 4	32.0	0.20	2.0
Halstead	.....	.....	.....	0.55	3.0
Hays	63	—15	30.0	T.	T.
Horton	54	— 7	28.2	0.20	1.0
Hutchinson	.....	.....	.....	0.69	6.5
Independence	61	— 2	33.0	0.70	2.5
Lawrence	60	— 7	30.1	0.53	4.1
Lebanon	60	—10	25.7	0.00	0.0
Lebo	62	— 8	29.4	0.27	2.2
McPherson	54	— 5	28.8	0.67	6.5
Manhattan *b*	59	— 9	29.2	0.15	1.3
Manhattan *c*	61	—12	29.8	0.17	1.6
Marion	59	—14	30.0	0.40	4.0
Meade	.....	.....	.....	T.	T.
Medicine Lodge	64	— 6	32.4	0.04	0.2
Minneapolis	60	—13	29.2	0.20	2.0
Morantown	59	— 5	30.8	0.40	3.0
Mounthope *[1]	60	— 5	31.2	0.40	3.0
Ness City	60	—10	29.4	0.25	.....
Newton	63	— 7	31.0	0.80	6.0
Oberlin	.....	.....	.....	0.90	9.0
Olathe	60	—10	29.4	0.20	2.0
Osage City	61	— 8	30.2	0.28	4.1
Osborne	.....	.....	.....	0.15	1.5
Oswego	64	— 2	34.9	0.73	0.5
Ottawa	62	— 9	29.4	0.52	4.5
Phillipsburg	.....	.....	.....	0.20	2.0
Pittsburg	56	— 4	30.6	1.20	2.0
Pratt	63[e]	— 8	31.0	0.60	6.0
Rome *[1]	64	— 3	33.2	0.18	T.
Russell	63	—18	29.4	0.38	3.0
Salina	62	—14	28.6	0.27	2.5
Sedan	64	— 4	32.7	0.42	2.5
Toronto	65	— 5	31.9	0.47	3.0
Ulysses	.....	.....	.....	0.20	2.0
Valley Falls	56	— 9	28.3	0.21	1.2
Viroqua	60	— 5	30.8	0.90	9.0
Wallace	.....	.....	.....	0.20	2.0
Wamego *[1]	56	— 5	27.9	0.26	1.6
Wellington	63	— 3	34.0	.....	.....
Winfield	66	— 5	30.8	0.25	0.5
Winona	.....	.....	.....	0.15	1.5
Yates Center	62	— 8	31.0	0.67	5.0
Kentucky.					
Alpha *[2]	.....	8	39.3	7.73	8.2
Ashland	52	0	29.3	6.90	3.5
Bardstown	63[f]	5	34.2[e]	7.08	4.5
Blandville	60	— 2	33.2	8.13	10.0
Bowling Green *b*	61	0	34.6	7.51	8.5
Burnside	.....	.....	.....	6.42	9.5
Caddo	62	4	31.6	5.40	18.0
Canton *[1]	65	5	36.9	7.07	17.0
Carlisle	61	1	32.4	6.37	14.5
Carrollton	62	4	32.5	3.30	6.4
Catlettsburg	.....	.....	.....	6.16	4.0
Earlington	64	0	33.8	5.91	9.0
Edmonton	62	2	36.0	6.18	8.7
Ensor	62	0	35.0	5.27	3.0
Eubank	61	— 1	34.8	6.22	7.0
Falmouth	.....	.....	.....	4.49	13.3
Fords Ferry	63	0	35.4	6.66	5.0
Georgetown	63	—11	33.7	.....	.....
Greensburg	66	— 2	33.6	7.34	11.2
Henderson	63	2	37.0	5.61	9.0
Hopkinsville	64	4	36.2	8.22	9.0
Irvington	62	3	33.6	4.66	8.2
Leitchfield	61	— 4	33.0	7.20	7.0
Loretto	64	—18	33.2	7.34	3.6
Marrowbone	68	2	34.7	7.27	9.0
Maysville	65	2	32.4	4.40	10.6
Middlesboro	62	4	36.6	5.21	6.4
Mount Hermon	62	6	36.2	6.05	5.7
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mount Sterling	63	— 2	33.6	7.93	7.0
Owensboro	63	1	35.3	5.51	4.6
Owenton	62	2	31.2	5.88	15.5
Paducah *a*	.....	.....	.....	7.90	5.0
Paducah *b*	65	0	36.4	8.08	6.8
Princeton	64	—12	33.2	5.54	9.0
Richmond	64	3	34.0	7.68	5.5
Russellville	67[e]	9[e]	40.6[e]	7.68	4.3
St. John	62	4	34.2	5.88	4.7
Scott	60	4	31.8	3.48	9.5
Shelby City	61	— 4	33.2	7.80	7.0
Shelbyville	63	0	33.4	5.55	13.5
Vanceburg	60	3	29.0	4.95	3.0
Williamsburg	64	5	37.0	5.77	10.0
Louisiana.					
Abbeville	78	24	52.2	6.46	
Alexandria	76	21	48.2	10.85	T.
Amite	74	23	51.2	7.44	T.
Bastrop	74	17	47.1	5.49	T.
Baton Rouge	79	24	51.0	7.10	
Calhoun	75	18	44.0	5.11	
Clinton	76	22	50.3	8.39	1.0
Donaldsonville	82	26	51.6	6.15	
Emilie	74	25	50.4	3.85	
Farmerville	76	16	44.2	5.46	T.
Franklin	76	28	51.1	3.41	
Grand Coteau	78	25	51.8	10.42	
Hammond	75	24	52.8	5.17	
Houma	80	29	54.6	1.00	
Jeanerette	79	24	50.8	5.18	T.
Jennings	.....	23	.....	14.01	
Lafayette	76	24	49.8	7.42	
Lake Charles	76	25	51.1	12.32	
Lake Providence	74	17	44.2	6.39	
Lawrence [e]	76	30	53.2	.....	.....
Liberty Hill	77	17	46.0	8.02	T.
Mansfield	.....	.....	.....	3.76	T.
Melville	74	21	51.7	9.15	T.
Minden [d]	74	19	44.8	3.42	
Monroe	75	17	46.1	5.76	
Montgomery	.....	17	.....	4.70	T.
New Iberia	77	25	51.4	6.68	
Oakridge	74	19	45.0	9.74	T.
Opelousas	77	23	49.4	8.33	
Oxford	75	19	46.2	6.12	T.
Paincourtville	80	27	53.3	5.01	
Plain Dealing	69	16	44.2	3.67	T.
Plaquemine	78	27	52.4	6.61	
Rayne	79	24	52.3	11.23	T.
Robeline	76	12	45.9	4.21	
Ruston	75	17	45.1	5.73	
Schriever	82	27	54.1	2.89	
Shellbeach	72	32	55.2	6.17	
Southern University	80	28	51.4	2.55	
Sugartown	74	24	51.0	11.03	
Venice	77	35	54.2	3.10	
Wallace	80	27	53.5	4.22	
White Sulphur Springs	.....	.....	.....	9.69	4.0
Maine.					
Bar Harbor	55	—10	22.2	5.52	13.5
Belfast *[3]	47	—12	19.6	3.73	9.0
Calais	43	—15	18.6	1.75	13.0
Cornish *[1]	45	—12	19.5	2.82	11.5
Cumberland Mills	52	—21	23.5	2.74	.....
Fairfield	47	—32	15.6	2.76	14.0
Farmington	51	—21	16.0	2.57	16.0
Flagstaff	50	—26	14.5	1.85	18.0
Gardiner	48	—18	19.6	3.41	18.0
Kineo [d]	46	—27	13.6	.....	.....
Lewiston	52	—19	19.0	3.19	14.4
Mayfield	45	—22	18.9	2.50	19.0
North Bridgton	53	—16	20.0	3.38	15.0
Orono	49	—21	15.2	2.75	10.0
Petit Menan	40	—12	25.4	.....	.....
Winslow	48[d]	—28[d]	14.2[d]	2.88	12.0
Maryland.					
Annapolis	57	8	34.8	3.83	8.5
Bachmans Valley	55	—11	28.4	4.32	7.5
Boettcherville	60	—14	30.5	1.31	5.0
Boonesboro	57	— 2	31.5	2.72	2.0
Charlotte Hall	60	— 1	34.2	4.15	6.0
Chase	54	—10	30.2	3.42	4.0
Cherryfields [2]	.....	.....	34.8	2.96	8.5
Chestertown	56	5	31.8	3.66	3.5
Chewsville	56	0	31.8	2.00	2.0
Coleman	55	4	32.6	4.21	5.0
Collegepark	.....	.....	.....	3.57	2.5
Cumberland *b*	67	— 7	34.7	2.60	9.0
Darlington	53	0	30.6	3.32	3.0
Deerpark	59	—23	27.0	2.33	.....
Denton	64	1	32.8	4.62	6.0
Easton	59	6	33.0	3.53	4.0
Ellicott City	56	— 8	30.8	4.74	5.5
Fallston	55	0	30.8	2.97	3.2
Frederick	56	— 7	31.4	2.72	6.5
Frostburg	61	— 2	30.8	4.53	7.2
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grantsville	61	—10	26.8	1.90	13.0
Greatfalls	58	— 3	32.7	3.81	2.2
Greenspring Furnace	58	— 9	30.2	3.31	6.7
Hagerstown	55	— 8	30.8	1.71	2.5
Hancock	58	— 7	29.8	2.84	.....
Jewell	66[b]	1[b]	32.2[b]	3.02	5.0
Johns Hopkins Hospital	59	6	31.2	4.17	4.9
Laurel	56	— 4	32.3	3.13	5.0
Mardela Springs	63	10	36.2	4.45	.....
Mount St. Marys Coll.	53	—14[j]	30.0[e]	2.45	12.2
New Market	55	— 2	30.6	3.37	7.5
Ocean City	70	10	37.4	3.27	10.0
Pocomoke City	69	8	39.3	2.48	5.2
Port Deposit	55	2	31.6	3.28	2.0
Princess Anne	63	1	36.0	2.73	6.8
Queenstown	57	2	32.8	3.58	6.2
Rockhall *a*	54	1	34.8	3.77	4.2
Rockhall *b*	54	1	33.0	3.77	4.5
Sandy Point	.....	.....	.....	2.79	4.5
Sharpsburg	55	— 8	31.2	3.40	8.0
Smithsburg *a*	57	—11	30.4	2.70	3.5
Smithsburg *b*	58	— 2	31.1	3.54	9.8
Solomons	57	11	35.3	3.41	7.8
Sudlersville	65	5	35.3	3.30	.....
Sunnyside	56	—24	26.4	6.59	12.2
Taneytown [1]	55	— 9	30.9	1.98	2.0
Van Bibber	53	— 1	29.4	3.50	.....
Westernport	56	— 3	29.1	1.80	3.0
Westminster	56[e]	2[e]	31.5[e]	3.32	9.2
Woodstock	58	6[f]	31.2[e]	2.54	1.8
Massachusetts.					
Adams	54	—15	23.6	.....	.....
Amherst	51	—18	24.2	3.41	5.5
Attleboro	.....	.....	.....	5.61	.....
Bedford [d]	48	— 3	25.9	3.51	2.5
Bluehill (summit)	53	— 7	26.2	5.28	11.0
Cambridge	55	— 8	27.3	4.96	.....
Chestnut Hill	53	—10	27.7	4.59	5.2
Cohasset	.....	.....	.....	5.22	.....
Concord	55	—17	24.7	3.02	5.5
Dudley [1]	48[e]	—11	24.0[f]	3.95	.....
East Templeton *[1]	45	— 7	22.2	2.23	5.0
Fallriver	51	— 3	28.7	5.56	5.5
Fiskdale	.....	.....	.....	2.37	.....
Fitchburg *a* *[1]	48	— 5	24.0	3.27	8.0
Fitchburg *b*	51	—11	24.2	3.47	9.0
Framingham	54	—10	26.4	4.19	....
Groton	52	—17	23.0	3.35	7.0
Hyannis *†[1]	48	0	29.7	3.66	5.2
Jefferson	.....	.....	.....	2.85	3.0
Lawrence	55	— 9	25.2	3.88	10.0
Leeds	52	—22	21.6	3.34	6.0
Leicester Hill	50	—11	23.4	3.02	2.0
Leominster	.....	.....	.....	3.17	9.5
Long Plain	.....	.....	.....	5.93	.....
Lowell *a*	52	—11	25.0	4.37	.....
Lowell *b*	54	—13	24.6	.....	.....
Ludlow Center	45	—10	21.2	2.80	.....
Mansfield *[1]	50	— 8	25.9	5.73	8.3
Middleboro	56	— 9	26.4	5.35	6.2
Monson	53	—25	24.8	3.64	5.5
New Bedford *a*	52	— 6	29.8	5.30	5.5
New Bedford *b*	54	— 6	30.0	5.70	4.5
New Salem	47	—12	21.6	3.32	7.2
Pittsfield	48	—10	20.5	2.42	8.0
Plymouth *[1] [d]	57	— 7	29.4	.....	.....
Princeton	.....	.....	.....	2.76	3.5
Salem	.....	.....	.....	4.54	8.5
Somerset *[1]	56	—10	29.8	5.41	8.0
South Clinton	.....	.....	.....	3.27	2.8
Springfield Armory	51	—15	26.0	3.20	4.0
Sterling	.....	.....	.....	2.78	3.0
Taunton *b*	52	— 6	26.2	5.44	.....
Taunton *c*	52	— 9	27.4	5.44	.....
Turners Falls	45	—25	22.7	2.92	.....
Webster	.....	.....	.....	4.77	7.6
Westboro	51	—12	26.3	4.79	10.8
Weston	55	—14	27.0	4.30	5.3
Williamstown	43	—26	20.7[d]	1.61	.....
Winchendon	.....	.....	.....	2.77	9.0
Worcester *b*	52	— 7	26.4	3.83	8.8
Michigan.					
Adrian	52	—12	23.4	1.91	2.2
Agricultural College	48	—14	21.7	2.03	2.8
Allegan	56	—21	24.4	1.90	19.0
Alma	45	—13	20.2	1.35	7.0
Ann Arbor [1]	50	—19[e]	22.8	1.53	3.2
Arbela	48	—10	22.0	1.80	2.0
Baldwin	48	—39	18.4	1.70	12.5
Ball Mountain	48	—10	20.6	1.17	5.1
Baraga	*43	—23	12.8	1.70	17.0
Battlecreek	50	—10	23.5	2.72	8.5
Bay City	53	—13	20.1	1.93	4.0
Berlin	49	—15	20.9	2.19	7.2
Berrien Springs	50	— 4	24.1	3.20	20.0
Big Point Sable *[10]	46	—2	22.9	.....	.....

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Big Rapids	44	−23	17.9	1.84	9.7
Birmingham	49	−13	22.7	1.74	4.0
Boon	43	−28	15.0	2.65	19.1
Calumet	45	−13	13.6	2.61	30.5
Camden	52	−16	23.3	2.13	4.5
Carsonville	52	−13	21.6	2.26	7.0
Charlevoix	42	− 5	20.4	2.11	20.0
Cheboygan	41	−19	16.3	1.48	9.2
Clinton	51	−15	23.6	1.70	1.5
Coldwater	52	−13	24.0	2.88	8.0
East Tawas	42	−12	19.2	.....	.....
Eloise	54	−10	24.0	1.56	3.5
Ewen	30	−39	8.1	1.70	17.0
Fairview	50	−11	21.5	1.51	5.5
Fitchburg	48	−12	22.4	1.95	9.3
Flint	50	−12	21.7	1.84	4.5
Frankfort	43	− 3	22.4	0.95	9.3
Gladwin	42	−17	18.1	1.50	8.0
Grand Rapids	48	−20	21.4	2.56	20.0
Grape	53	−10	25.0	1.98	5.2
Grayling	48	−21	15.1	1.15	9.0
Hanover	51	−14	22.2	2.12	6.2
Harrison	41	−19	16.2	0.94	8.0
Harrisville	46	−16	17.8	1.40	8.2
Hart	44	− 4	22.2	1.65	8.5
Hastings	47	−21	20.6	2.27	8.3
Hayes	48	−10	22.0	0.90	2.2
Highland Station	.....	.....	...	2.81	8.0
Hillsdale	51	−14	23.2	2.44	4.2
Holland [9]	42	− 2	25.7	.....	.....
Howell	48	−13	22.6	2.18	2.0
Humboldt	39	−40	6.6	...	.....
Ionia	47	−23	20.3	0.93	4.5
Iron River	41[c]	−41[c]	5.0[d]	0.75	7.7
Ishpeming	38	−26	9.3	2.34	22.6
Ivan	42	−19	18.0	1.78	13.5
Jackson	52	− 8	23.9	2.11	.....
Jeddo	48	−11	20.6	2.74	10.4
Kalamazoo	49	−15	23.6	1.61	11.2
Lake City	44	−24	15.5	0.50	5.0
Lansing	49	−10	21.6	2.05	6.0
Lathrop	38	−27	10.6	1.90	19.0
Ludington	40	− 4	19.8	0.92	5.9
Luzerne	42	−19	13.8	0.82	3.3
Mackinaw City	42	−20	16.0	1.91	14.0
Madison	51	−14	23.6	2.33	2.2
Mancelona	40	−14	15.8	1.80	15.5
Manistee	43	− 5	20.7	0.79	6.5
Manistique	36	−24	12.6	1.45	10.0
Middle Island [10]	41	−10	19.2	.....	.....
Mottville	51	−15	23.2	2.32	3.8
Mount Clemens	52	−12	22.8	1.45	.....
Mount Pleasant	44	−15	19.6	0.98	8.0
Muskegon	44	− 5	22.2	2.75	16.0
Newberry	40	−28	13.8	2.10	17.0
Northport	46	1	23.6	1.60	15.5
Old Mission	42	− 5	20.3	2.04	20.4
Olivet	49	−12	21.9	2.59	4.2
Omer	43	−16	17.4	0.80	.....
Ovid	48	−13	21.8	1.70	3.6
Parkville	.....	.....	...	2.84	7.0
Petoskey	42	−13	17.9	2.15	15.0
Plymouth	50	−12	23.2	1.25	.....
Port Austin	47	− 8	21.6	0.90	2.0
Powers	.....	.....	.....	1.57	15.7
Reed City	42	−28	15.2	0.69	6.9
Rockland	41	−28	8.0	2.50	25.0
Rogers City	42	−18	15.6	0.35	1.0
Romeo	43	− 7	22.4	1.55	9.5
Saginaw	49	−11	21.5	1.82	5.2
St. Ignace	42	−21	17.0	1.63	17.0
St. Johns	48	−10	22.4	1.34	3.0
St. Joseph	50	3	26.0	0.25	.....
Sandbeach	48	−11	21.0	1.41	5.0
Sidnaw	40	−32	9.1	1.94	19.3
Somerset	52	−12	22.4	2.06	.....
South Haven	52	− 1	24.2	1.46	6.0
Stanton	44	−17	19.0	.....	...
Thomaston	42	−39	6.7	1.80	18.0
Thornville	50	− 8	21.8	3.31	10.5
Thunder Bay Island [10]	35	−10	21.0	.....	.....
Traverse City	46	−16	16.6	1.09	10.5
Vandalia	50	−14	22.8	2.67	7.6
Vassar	49	−11	21.2	1.95	1.8
Vermillion Point [10]	32	−12	11.3	.....	...
Wasepi	52	−15	23.6	2.80	4.0
Waverly	49	−13	22.0	1.90	9.0
West Harrisville	42	−16	17.3	1.11	3.5
Wetmore	39	−38	9.6	3.13	32.0
White Cloud	43	−23	19.8	1.12	6.0
Williamston	...	.....	.....	2.00	2.5
Ypsilanti	50	−11	23.6	1.91	3.4
Minnesota.					
Ada	40[c]	−33	1.5[c]	0.74	5.0
Albert Lea	41	.....	.....	0.25	1.6
Alexandria	44	−33	9.2	1.16	11.6
Minnesota—Cont'd.					
Beardsley	45	−25	14.0	0.98	.....
Bird Island	45	−22	13.0	0.60	0.3
Blooming Prairie	36	−27	11.8	0.35	3.5
Brainerd	40	−35	4.4	0.20	.....
Caledonia	39	−27	14.2	0.41	2.8
Collegeville	42	−26	14.0	0.33	3.0
Crookston	43	−29	3.4	0.50	6.0
Deephaven	.....	.....	.....	0.79	.....
Detroit City	43	−42	−0.4	1.00	.....
Farmington	40	−31	11.8	0.90	9.0
Fergus Falls	42	−29	7.8	0.62	6.0
Glencoe	45	−28	11.3	0.59	.....
Glenwood	43	−28	10.2	1.48	4.5
Grand Meadow	38	−27	9.5	0.19	4.0
Lake City	42	−27	14.3	0.48	2.5
Lake Jennie	43	−25	12.8	0.42	2.0
Lakeside	45	−23	13.0	0.64	2.2
Lake Winnibigoshish	37	−45	0.7	0.57	5.6
Leech Lake	41	−52	0.1	0.79	8.1
Long Prairie	40	−32	8.6	0.73	6.0
Luverne	46	−22	16.0	0.97	5.4
Lynd	46	−27	18.0	0.30	.....
Mapleplain	.....	.....	.....	0.81	6.6
Milaca	42	−36	5.1	0.45	4.5
Milan	47	−26	12.3	1.00	5.0
Minneapolis *a*	40	−31	10.6	0.81	7.5
Minneapolis *b* [1]	40*	−30	12.0	0.86	7.7
Minnesota City [*1]	42	−30	14.8	1.04	8.0
Montevideo	46	−25	13.1	0.90	2.0
Morris	42	−28	11.2	0.36	2.5
Mount Iron	34	−41	2.6	0.24	2.4
Newfolden	37	−39	−1.4	1.39	6.3
New London	40	−28	8.1	0.50	1.5
New Richland [*1]	40	−28	11.0	.....	.....
New Ulm	41	−22	14.1	0.42	2.0
Park Rapids	39	−41	3.8	0.63	6.3
Pine River	39	−43	4.1	0.49	4.3
Pipestone	44	.....	.....	0.20	0.5
Pleasant Mounds	49	−22	14.6	0.09	1.2
Pokegama Falls	35	−54	0.3	0.75	7.7
Redwing	.....	.....	...	2.25	.....
Reeds	.....	.....	.....	0.67	6.5
Rolling Green	41	−22	13.6	T.	T.
St. Charles	45	−27	14.8	0.88	3.0
St. Cloud	38	−28	9.5	0.30	2.0
St. Olaf	41	−27	8.0	0.82	8.2
St. Peter	44	−19	16.3	0.31	1.8
Sandy Lake Dam	36	−52	3.8	0.47	5.5
Shakopee	41	−25	14.4	0.64	6.4
Slayton	48	−25	16.3	T.	T.
Tower	40	−48	−1.7	.....	.....
Two Harbors	43	−31	9.5	0.64	6.2
Wabasha [*1]	39	−31	13.7	.....	.....
Willmar	44	−26	10.9	0.63	1.0
Willow River	38	−48	6.8	0.50	5.9
Winnebago City	44	−17	14.8	T.	T.
Worthington	44	−25	14.4	.....	.....
Zumbrota [1]	42*	−30	14.1	.....	.....
Mississippi.					
Aberdeen	66	18	40.8	4.20	
Agricultural College	64	15	43.4	8.37	
Austin	65	9	41.8	5.84	1.5
Batesville	68	9	43.7	6.84	1.0
Bay St. Louis	72	28	50.1	4.84	
Biloxi	74	30	50.4	4.22	
Booneville	62	6	40.0	5.79	2.0
Briers	70	23	47.3	10.96	
Brookhaven	75	18	49.8	10.42	0.2
Canton	71	18	45.8	13.25	
Columbus *a*	.....	.....	.....	9.91	
Crystal Springs	73	19	47.4	8.89	T.
Edwards	72	18	46.2	10.73	
Fayette	77	19	48.0	10.35	T.
French Camps	.....	.....	.....	8.70	T.
Greenville *a*	64	17	42.4	5.38	T.
Greenville *b*	69	22	44.8	5.30	T.
Greenwood	70	17	45.6	.....	.....
Hattiesburg	70	25	48.5	3.93	T.
Holly Springs	63[j]	8[j]	37.4[j]	5.15	4.0
Kosciusko	70	15	42.8	8.65	T.
Lake	68	19	44.2	8.71	
Leakesville	78	22	50.2	6.92	T.
Logtown	71	28	52.3	3.90	
Louisville	65	14	41.0	9.02	T.
Macon	66	15	43.0	7.98	
Magnolia	73	22	48.1	6.73	1.5
Mosspoint	68	28	49.1	6.35	
Natchez	79	21	48.4	11.05	.....
Palo Alto	67	15	43.9	7.88	0.2
Pontotoc	65	10	41.4	6.88	0.5
Port Gibson	77	17	48.2	12.12	
Ripley	63	1	37.1	4.86	1.5
Rosedale	68	12	41.6	.....	.....
Stonington [*1]	76	20	47.0	.....	.....
Tupelo	.....	.....	.....	6.23	
Walnut Grove	69[c]	23[c]	47.2[c]	11.48	
Mississippi—Cont'd.					
Water Valley [*1]	68	14	40.9	7.35	1.1
Waynesboro	73	21	49.3	5.16	4.0
Woodville	74	20	48.4	9.73	0.5
Yazoo City	74	17	44.7	8.36	T.
Missouri.					
Appleton City	66	− 6	31.7	0.66	5.9
Arthur [*2]	.....	− 4	28.2	0.92	7.0
Avalon	55	−16	28.0	0.50	1.5
Bethany	52	−17	24.4	0.55	3.0
Birchtree	67	− 7	31.7	2.52	4.0
Boonville	.....	.....	.....	0.50	2.2
Brunswick	56	−12	27.8	0.65	2.0
Carrollton	58	− 9	30.4	0.71	2.1
Conception	55	−14	28.2	0.59	5.0
Cook Station	.....	.....	.....	2.15	4.5
Cowgill [*5]	56	−14	28.0	0.31	1.5
Darksville	54	−12	27.0	0.10	0.5
East Lynne [*3]	.....	− 8	29.8	0.65	6.0
Edgehill [*5]	58	− 2	30.0	2.46	2.8
Eightmile [*1]	60	− 4	29.5	0.46	4.1
Eldon	66	−14	31.8	1.50	9.5
Elmira	66	−17	27.0	0.01	T.
Fairport	.....	.....	.....	0.35	2.8
Farmersville	.....	.....	.....	0.35	1.8
Fayette	61	−14	28.6	0.59	4.0
Fulton	.....	.....	.....	1.00	4.0
Galena	.....	.....	.....	1.70	3.6
Gallatin [*1]	54	− 8	28.1	0.37	1.5
Gayoso	61	1	38.0	8.28	10.5
Glasgow	63	−13	29.5	0.65	...
Gordonville [*3]	.....	− 2	31.2	6.89	8.2
Gorin	.....	.....	.....	0.33	1.0
Halfway	62	− 7	32.6	1.18	3.5
Harrisonville	61	− 7	29.0	0.40	3.2
Hermann	.....	.....	.....	0.98	5.0
Houston	63	− 7	33.5	1.94	3.0
Houstonia	.....	.....	.....	0.75	5.9
Irena	.....	.....	.....	0.47	2.5
Ironton	66	− 7	31.3	2.89	4.2
Jefferson City	64	− 9	30.4	0.95	5.0
Kidder	53	−17	27.2	0.43	2.2
Lamar	65	− 5	34.4	0.86	3.2
Lamonte	.....	.....	.....	0.45	4.0
Lebanon	63	− 7	33.0	1.79	2.5
Lexington	61	−11	30.5	0.38	T.
Liberty	59	−14	28.2	0.30	1.5
Louisiana	55	−10	29.4	0.87	5.7
McCune [*1]	59	−11	30.0	1.06	6.2
Marblehill	63	− 5	33.0	6.36	6.4
Marshall	62	−14	29.2	0.53	3.2
Maryville	52	−17	24.2	0.50	3.5
Mexico	61	−11	29.2	1.19	5.0
Miami	.....	.....	.....	0.43	1.8
Mineralspring	61	− 8	32.4	2.92	4.5
Montreal	63	−10	31.2	1.53	6.0
Mount Vernon	70	− 4	35.3	1.50	4.0
Neosho	64	− 4	34.2	1.75	7.0
Nevada [*1]	60	− 5	30.2	1.22	8.0
New Haven	68	− 6	31.2	1.37	2.7
New Madrid	68	5	38.6	12.61	12.9
New Palestine	.....	−10	.....	0.88	2.8
Oakfield	64	− 8	32.4	1.71	5.5
Olden	63	− 9	32.4	2.84	5.0
Oregon *a*	54	−14	26.6	0.66	3.8
Oregon *b*	56	−12	27.6	0.67	3.4
Palmyra [*5]	50	−10	27.4	0.79	4.0
Phillipsburg [*1]	60	− 9	30.0	1.74	3.3
Pickering [*3]	.....	−21	22.8	0.55	2.0
Poplarbluff	61	− 2	35.2	7.51	3.5
Potosi	62	−11	29.6	2.32	6.0
Princeton	51	−13	24.8	0.22	1.0
Rhineland	67	−13	31.2	1.21	2.7
Richmond	57	−10	28.7	0.19	T.
Rolla	.....	.....	.....	1.65	5.0
St. Charles	59	− 6	31.5	1.30	2.8
St. Joseph	.....	.....	.....	0.36	1.5
Sarcoxie [*3]	.....	− 8	26.7	1.21	2.5
Sedalia	.....	−12	.....	0.78	3.5
Seymour	60	− 8	30.3	2.25	5.0
Shelbina	.....	.....	.....	1.24	3.0
Sikeston	62	− 8	32.9	7.54	19.0
Steffenville	51	−12	27.8	0.80	5.0
Stellada	61	−11	30.6	0.56	4.5
Sublett	52	−15	26.4	1.15	2.0
Vichy	68	−14	32.4	2.00	4.0
Warrensburg	62	−11	29.7	0.45	3.5
Warrenton	60	− 8	30.0	1.21	4.0
Wheatland	.....	.....	.....	2.04	8.0
Willow Springs	61	− 7	32.2	2.95	5.0
Wylie	67	− 9	35.6	1.67	3.5
Zeltonia	64	− 6	33.0	2.20	5.0
Montana.					
Adel	45	−42	19.6	2.31	23.1
Big Timber	46	−22	20.8	1.68	25.2
Billings	46	−16	20.6	0.96	9.6
Boulder	46	−28	19.6	1.65	16.5

TABLE II.— *Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Butte	45	− 6	26.8	2.35	23.5
Canyon Ferry	46	−18	19.4	0.94	7.0
Castle	48	−18	19.5	1.68	.....
Columbia Falls	44	−22	21.2	2.11	21.1
Corvallis	55	−13	22.7	0.70	7.0
Crow Agency	49	−15	21.0	1.11	12.5
Darby [5]	52	0	30.0	0.10	.....
Dearborn Canyon	49	−34	22.4	2.40	24.0
Deer Lodge	49	−22	23.9	.....	.....
Dell	45	−14	21.8	0.30	2.0
Dupuyer	49	−20	21.0	.....	.....
Ekalaka	47	−22	16.8	0.30	3.0
Florence	54	−15	28.1	1.13	.....
Fort Benton	47	−19	20.8	0.60	6.0
Fort Keogh	48	−18	17.2	0.60	6.0
Fort Logan	49	−45	17.6	1.26	.....
Glasgow	43	−37	6.8	0.40	.....
Glendive	50	−25	16.0	0.70	7.0
Glenwood	42	−21	19.4	2.08	.....
Greatfalls	52	−24	22.1	1.10	22.5
Kalispel	52	−19	23.2	3.35	31 0
Kipp	45	−39	16.7	1.62	16 2
Livingston	50	−11	25.0	1.06	20.2
Manhattan	50	−32	20.4	0.40	4.0
Martinsdale	45	−15	21.1	2.50	25 0
Marysville	41	−19	19.8	2.70	46.0
Missoula	47	−14	26.8	0.73	4.0
Parrot	60	−24	24.2	1.20	12.0
Plains	51	−13	26.8	1.40	14.0
Poplar	45	−28	6.8	1.20	12.0
Radersburg	.....	.....	.....	1.00	10 0
Redlodge	50	−15	19.4	2.85	28.5
Ridge	53	−20	18.5	0.58	5.8
St. Ignatius	49	−20	26.2	0.92	14.0
St. Pauls	44	−25	16.5	.....	.....
Shelby	50	−21	18.0	.....	.....
Troy	56	−26	24.2	3.95	28.5
Twin Bridges	50	−22	24.2	0.35	3.5
Utica	48	−24	20.4	1.69	23.0
Wibaux	48	−24	14.9	.....	.....
Yale	47	−14	22.7	1.70	17.0
Nebraska.					
Agee [*1]	59	−18	30.9	0.27	3.0
Alliance	.....	.....	.....	0.43	3.5
Alma	66	− 9	26.6	0.10	1.0
Ansley	64	−14	23.0	0.04	0.5
Arapaho [*1]	64	−10	25.6	0.20	2.0
Arborville [*1]	62	−14	23.9	T.	T.
Ashland *a*	62	−15	24.9	0.03	.....
Ashland *b* [*1]	50	−13	23.3	0.06	1.8
Ashton	.....	.....	.....	0.09	1.0
Auburn	57	−14	25.7	0.27	2.2
Aurora [*1]	60	−11	25.4	0.05	0.5
Bartley	.....	.....	.....	0.10	1.0
Bassett	.....	.....	.....	0.19	2.0
Beatrice	59	−12	24.4	T.	T.
Beaver City	66	−15	28.1	0.10	1.0
Bellevue	.....	.....	.....	0.05	1.5
Benedict	.....	.....	.....	0.07	0.4
Benkleman	.....	.....	.....	0.40	4.0
Blair	58	−18	21.8	0.08	0.4
Bluehill	.....	.....	.....	T.	T.
Bradshaw	.....	.....	.....	0.05	0.5
Brokenbow	.....	.....	.....	T.	T.
Burwell	.....	.....	.....	T.	T.
Callaway	60	−16	22.6	T.	T.
Camp Clarke	55	−16	21.4	0.80	8.0
Central City	.....	.....	.....	T.	T.
Chester	.....	.....	.....	0.05	0.0
Cody	.....	.....	.....	0.50	5.0
Columbus	61	−16	23.2	0.01	T.
Creighton	58	−20	19.0	0.10	1.0
Crete	61	−13	26.2	0.23	2.0
Culbertson	.....	.....	.....	0.50	4.4
David City	60	−17	22.2	0.40	1.0
Dawson	60	− 9	28.8	0.14	0.9
Dunning	.....	.....	.....	0.00	0.0
Eden	.....	.....	.....	0.20	2.0
Edgar [*5]	62	−14	26.6	0.05	0.5
Elba	.....	.....	.....	T.	T.
Ericson [*1]	53	−18	19.0	T.	T.
Ewing	.....	.....	.....	0.28	0.5
Fairbury	64	−11	24.4	T.	T.
Fairfield	.....	.....	.....	T.	T.
Fairmont	63	−14	23.4	T.	T.
Fort Robinson	74	−18	30.8	0.28	2.8
Franklin [d]	61	−13	23.2	0.00	
Fremont	60	−17	21.9	0.15	1.5
Geneva	64	−13	23.9	0.17	1.0
Genoa	61	−15	22.6	0.07	0.5
Gordon	.....	.....	.....	0.20	.....
Gothenburg	61	− 9	23.8	0.20	2.0
Grand Island *a*	67	−15	27.0	0.16	1.0
Grand Island *b*	64	−14	25.0	0.12	1.2
Grand Island *c*	57	−15	23.8	.....	.....
Greeley	.....	.....	.....	T.	T.
Haigler	.....	.....	.....	0.30	3.0
Hartington	57	−21	18.8	0.85	5.5
Harvard	63	−13	24.2	0.01	T.
Hastings [*1]	61	−12	25.3	0.04	T.
Hayes Center	.....	.....	.....	0.50	5.0
Hay Springs	55	−15	21.3	0.41	3.5
Hebron	63	−11	25.1	0.05	0.5
Hickman	.....	.....	.....	0.20	3.5
Holdrege	.....	.....	.....	T.	T.
Hooper [*1]	56	−18	21.1	0.07	0.2
Imperial	60	−13	26.8	1.00	9.5
Johnstown	.....	.....	.....	T.	T.
Kearney	.....	.....	.....	0.00	
Kennedy	64	−20	23.3	0.55	5.0
Kimball	52	− 9	24.4	0.65	6.5
Kirkwood [*1]	58	−20	19.1	0.42	4.0
Lexington	60	−11	21.8	0.05	0.5
Lincoln *b*	62	−13	25.8	0.09	0.8
Lincoln *d*	53	−11	25.2	0.15	2.2
Lodgepole	60	−15	23.8	1.50	15.0
Loup [*1]	62	−12	21.9	T.	T.
Lynch [*1]	59	−19	19.1	0.16	1.8
Lyons	.....	.....	.....	0.12	T.
McCook [*1]	56	− 9	27.5	0.50	5.0
McCool	60	−10	25.8	0.03	0.5
Madison	60	−17	24.0	0.12	1.0
Madrid [*5]	60	−12	22.4	0.60	6.0
Marquette	.....	.....	.....	0.20	2.0
Merriman	.....	.....	.....	0.80	8.0
Minden *a*	64	−12	24.8	0.03	0.2
Minden *b*	.....	.....	.....	0.03	....
Monroe	.....	.....	.....	0.07	0.6
Nebraska City *c*	57	−14	24.4	0.18	.....
Nemaha [*1]	55	−14	24.4	0.10	1.0
Nesbit	59	−13	22.6	0.10	1.0
Norfolk	58	−21	19.8	0.05	1.0
North Loup	62	−14	22.0	0.60	1.0
Oakdale	58	−17	20.0	0.08	0.5
Odell	.....	.....	.....	0.00	
O'Neill	59	−20	20.4	0.18	0.8
Ord	.....	.....	.....	T.	T.
Osceola	.....	.....	.....	T.	T.
Ough	.....	.....	.....	0.80	8.0
Palmer	.....	.....	.....	T.	T.
Palmyra [*1]	59	−14	23.9	0.09	1.7
Paxton	.....	.....	.....	0.30	3.0
Pleasant Hill	.....	.....	.....	0.22	2.4
Ravenna *a*	64	−12	24.4	0.05	0.5
Redcloud *a*	.....	.....	.....	T.	T.
Redcloud *b*	.....	.....	.....	0.04	0.4
Republican [*1]	50[c]	−13[d]	23.5[d]	0.20	2.0
Rulo [*1]	56	− 5	29.9	0.20	2.0
St. Libory	.....	.....	.....	0.12	0.5
St. Paul	.....	.....	.....	0.16	T.
Salem [*1]	54	−10	25.4	0.20	2.0
Santee Agency	58	−21	21.0	0.16	1.5
Schuyler	.....	.....	.....	0.05	0.5
Seneca [*1]	50	−15	24.0	0.20	2.0
Seward [*1]	60	−11	24.0	0.24	0.2
Spragg	.....	.....	.....	0.10	1.0
Springview	56	−21	17.8	0.95	9.5
Stanton	.....	.....	.....	0.09	T.
State Farm	62	−13	25.8	.....	.....
Stockham	.....	.....	.....	0.50	1.0
Strang [*1]	58	−13	24.5	T.	T.
Stratton	.....	.....	.....	0.49	5.8
Superior [*5]	52	−12	29.6	0.00	
Syracuse	.....	.....	.....	0.35	3.5
Tablerock	.....	.....	.....	0.17	1.8
Tecumseh *b*	53	−12	31.4	0.05	0.5
Tecumseh *c*	.....	.....	.....	0.05	0.5
Tekamah	58	−17	22.7	0.07	0.5
Thedford [*1]	60	−12	23.6	0.15	1.5
Turlington	59	−14	24.6	0.32	3.0
Valentine	60	−17	21.0	0.47	.....
Wakefield	57	−19	21.1	0.13	0.8
Wallace	.....	.....	.....	0.76	.....
Wauneta	.....	.....	.....	0.60	6.0
Weeping Water [*1]	55	−16	19.4	0.35	3.5
Westpoint	57	−18	23.2	T.	T.
Whitman	.....	.....	.....	0.10	1.0
Wilber [*1]	62	−10	27.0	T.	T.
Willard	.....	.....	.....	0.03	.....
Wilsonville [*1]	62	−14	24.8	0.30	3.0
Wisner	.....	.....	.....	0.07	0.2
Wymore [*1]	54	− 9	26.6	T.	T.
York [*1]	60	−14	23.2	T.	T.
Nevada.					
Battle Mountain [*1]	47	12	28.0	T.	
Beowawe [*1]	58	2	29.4	0.60	6.0
Blaine	50	1	29.1	0.75	5.0
Bunkerville	.....	.....	.....	0.65	.....
Candelaria	64	9	35.1	1.30	13.0
Carlin [*1]	47	2	33.4	1.00	5.0
Carson City	63	− 6	35.1	2.21	25.6
Clover Valley	.....	.....	.....	2.14	.....
Cranes Ranch	.....	.....	.....	0.69	.....
Darrough Ranch	.....	.....	.....	0.71	4.0
Ely	46	−10	26.2	2.05	20.5
Fenelon [*1]	45	0	25.0	1.64	18.0
Golconda [*1]	52	8	30.0	0.45	2.5
Halleck [*1]	50	−10	27.0	0.63	6.2
Hawthorne *b*	62	7	35.8	0.39	5.0
Hot Springs	.....	.....	.....	0.20	2.0
Lewers Ranch	61	5	36.8	2.41	22.2
Los Vegas	65	17	40.1	0.40	
Martins	58	− 5	35.4	0.78	1.0
Monitor Mill	48	−12	26.6	1.88	18.0
Palisade [*1]	53	− 1	30.9	0.70	7.0
Palmetto	63	− 4	30.4	1.20	12.0
Panaca	61	− 2	31.1	0.37	.....
Reno State University	.....	2	.....	1.12	.....
St. Clair	58	10	33.6	0.30	3.0
Silverpeak	64	1	33.6	T.	T.
Sodaville	63	1	33.9	0.49	7.0
Tecoma [*1]	50	− 2	25.9	0.40	4.0
Toano [*1]	46	0	27.5	1.90	16.0
Tuscarora	41	− 4	21.1	.....	.....
Tybo	49	.....	.....	1.75	26.0
Verdi [*1]	56	10	38.6	.....	.....
Wadsworth [*1]	62	16	34.9	0.30	2.0
Wells	47	−16	27.6	1.33	4.5
New Hampshire.					
Alstead [*6]	44	−19	17.8	2.41	12.5
Berlin Mills	50	−22	14.6	1.98	10.5
Bethlehem	49	−17	15.4	2.43	15.5
Brookline [*1]	50	−28	22.8	2.00	10.0
Concord	52	−17	20.6	2.55	8.8
Durham	54	− 8	23.4	.....	.....
Grafton	49	−19	15.8	2.02	15.0
Hanover	50	−23	16.6	2.19	8.0
Keene	49	−28	20.3	2.68	10.5
Littleton	50	−19	14.7	1.56	9.0
Nashua	53	−19	22.9	3.51	12.0
Newton	53	− 9	23.8	3.11	9.0
North Conway	56	−25	17.8	3.25	17.0
Peterboro	46	−22	20.4	2.26	7.5
Plymouth	55	−14	16.2	2.83	16.5
Sanbornton	48	−16	18.4	2.32	9.0
Stratford	49	−22	15.4	2.08	13.0
Warner	.....	.....	.....	2.95	12.0
New Jersey.					
Asbury Park	50	0	32.4	4.21	5.0
Barnegat	52	5	33.4	2.48	0.5
Bayonne	53	4	30.4	4.62	7.5
Belvidere	48	−11	24.5	3.54	5.0
Bergen Point	54	5	30.6	5.41	5.0
Beverly	56	− 2	30.9	4.89	7.8
Billingsport [*1]	53	6	30.8	5.03	9.0
Boonton	52	− 5	27.6	4.09	9.0
Bridgeton	57	4	33.3	3.48	6.0
Camden	56	3	30.6	4.46	5.8
Cape May C. H.	59	3	35.0	3.14	0.7
Charlotteburg	52	− 7	27.3	3.38	5.0
Chester	50	− 5	25.6	3.66	6.0
Clayton	58	− 2	31.4	3.58	6.0
College Farm	53	− 5	29.8	4.88	5.0
Deckertown	47	−10	25.5	3.45	8.5
Dover	52	− 8	26.4	4.15	11.0
Egg Harbor City	57	− 1	31.0	3.01	4.0
Elizabeth	54	− 3	29.4	4.78	.....
Englewood	51	−17	26.2	5.00	4.2
Flemington	52	−11	28.1	4.38	7.5
Freehold	57	0	30.8	4.64	.....
Friesburg	58	− 1	32.5	3.30	4.0
Gillette	.....	.....	.....	4.32	9.0
Hammonton	.....	.....	.....	3.47	7.0
Hanover	51	− 6	28.7	3.68	10.0
Hightstown	57	− 1	29.8	3.01	6.0
Imlaystown	58	1	32.2	4.15	4.2
Lambertville [e]	51	7	28.2	2.48	1.0
Lebanon	.....	.....	.....	3.86	3.3
Moorestown	60	1	30.1	4.46	5.8
Mount Pleasant	.....	.....	.....	2.70	4.5
Newark	54	2	29.0	5.10	7.5
New Brunswick	53	− 3	30.2	5.26	6.1
Newton	50	− 7	24.9	3.98	.....
Ocean City	56	3	32.8	2.73	5.0
Oceanic	59	2	29.7	4.18	2.5
Paterson	53	− 2	31.0	4.61	4.5
Perth Amboy	56	− 1	30.7	4.67	6.5
Plainfield	52	− 7	28.3	5.29	9.0
Port Norris	57[d]	2[d]	33.5[d]	2.82	4.5
Rancocas	.....	.....	.....	4.04	7.0
Rivervale	52	−21	25.2	5.73	8.0
Roseland	52	− 8	27.0	5.15	11.8
Salem	56	4	32.8	3.70	4.0
Somerville	51	−10	28.8	5.08	7.0
South Orange	53	− 4	27.4	4.99	8.5
Staffordville	.....	.....	.....	3.67	8.0
Toms River	59	− 5	32.2	3.89	8.0
Trenton	54	3	29.4	4.33	7.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vineland	57	2	33.0	3.19	4.5
Woodbine	59	— 1	34.8	2.60	5.0
New Mexico.					
Albert	54	7	34.4	0.05	0.5
Albuquerque	56	7	31.6	0.35	3.5
Aztec	48	—11	19.0	0.57	5 7
Bernalillo	58	11	32.2	0.15	3.0
Bluewater	52	— 2	26.9	0.90	9.0
Buckmans	38[f]	—21[f]	12.7[f]	0.51	5.4
Clayton [f]	62	2	32.4	0.40	4.0
East Lasvegas	59	8	33.1	T.	T.
Eddy	73	14	44.2	0.00	
Engle	58	10	32.8	0.55	0.0
Espanola	54	0	25.3	0.05	0.5
Folsom	51	0	26.6	0.70	7.0
Fort Bayard	61	11	37.1	0.30	3.0
Fort Union	64	5	32.4	T.	T.
Fort Wingate	59	1	27.0	0.28	2.8
Gage [*1]	60	24	42.1	0.36	
Gallisteo	55	2	29.8	0.20	2.0
Gallinas Spring	60	5	32.6	0.02	T.
Gila	64	16	38.8	1.03	1.0
Hillsboro	.....	12	.....	0.00	
Laluz	58	20	35.8	0.33	T.
Las Vegas Hotsprings	55	6	31.6	T.	T.
Lordsburg [*1]	64	17	38.4	0.33	
Los Lunas	56	7	30.2	0.25	2.0
Lower Penasco	64	10	37.8	T.	T.
Mesilla Park	69	8	38.9	0.05	
Monero	43	—11	16.2	0.93	.....
Puerto de Luna	60	8	37.0	T.	T.
Raton	55	0	26.2	T.	T.
Rincon	67	10	40.2	0.27	
Roswell	72	4	37.8	0.06	
San Marcial	69	10	38.1	0.00	
Shattucks Ranch	61	8	36.8	0.45	5.5
Socorro	62	8	32.4	0.01	0.2
Strauss [*1]	72	27	45.2	.....	.....
White Oaks	53	8	31.8	0.90	9.0
Winsors Ranch	51	—8	21.8	0.70	.....
New York.					
Adams	.....	.....	.....	3.59	.....
Addison	55	—10	23.0	1.87	13.8
Akron	.....	.....	.....	2.28	.....
Alden	.....	.....	.....	.....	.....
Alfred	56	—16	22.2	2.20	12.0
Angelica	55	—17	22.5	2.04	13.0
Appleton	54	— 2	25.5	1.29	3.5
Arcade	54	—14	21.0	2.22	8.2
Atlanta	.....	.....	.....	1.31	.....
Auburn	55	— 6	25.0	1.30	3.0
Avon	55	—10	23.8	0.81	6.8
Baldwinsville	56	— 7	24.0	1.33	6.0
Bedford	52	—17	27.4	3.90	8.6
Big Sandy [*10]	46	—25	20.4	.....	.....
Bolivar	62	—15	22.1	2.19	8.0
Bouckville	42	—20	17.6	2.43	15.0
Boyds Corners	.....	.....	.....	3.37	.....
Brentwood	54	—13	28.3	4.10	10.0
Canajoharie	54[e]	—18[e]	32.6[e]	1.03	.....
Canton	53	—24	18.2	1.71	5.2
Carmel	50	—11	25.2	3.59	4.2
Carvers Falls	43	—33	18.6	2.21	13.0
Catskill	50	—10	23.8	1.45	3.0
Cedarhill	50	—12	23.2	1.62	4.0
Charlotte [*10]	56	2	26.6	.....	.....
Chenango Forks	.....	.....	.....	1.70	.....
Cherry Creek	.....	.....	.....	3.50	.....
Cherry Valley	.....	.....	.....	1.49	.....
Cooperstown	50	—18	20.2	2.22	10.0
Cortland	51	—16	22.0	1.88	11.2
Cutchogue	54	6	30.4	5.42	4.0
Dekalb Junction	.....	.....	.....	1.92	.....
Dryden	51	—19	21.0	1.29	.....
Eagle Mills	.....	.....	.....	0.55	.....
Easton	.....	.....	.....	1.82	.....
Elizabethtown [*1]	50	—24	22.1	.....	.....
Elmira	50	— 4	28.9	1.51	.....
Fayetteville	.....	.....	.....	0.98	.....
Fleming	48	— 4	23.6	.....	.....
Fort Niagara	53	— 3	24.5	1.57	2.0
Franklinville	55	—21	20.8	2.14	9.2
Fulton	.....	.....	.....	1.38	.....
Garrattsville	50	—18	21.7	.....	.....
Glens Falls	47	—20	20.0	2.54	14.0
Gloversville	40	—20	17.1	2.32	17.7
Greenwich	52	—25	20.1	2.72	12.8
Haskinsville	.....	.....	.....	0.99	.....
Hemlock Lake	52	—11	22.1	0.79	4.8
Honeymead Brook	52	—14	24.0	2.75	2.6
Humphrey	53	— 8	22.8	1.67	14.3
Ithaca	51	—11	22.8	1.67	12.5
Jamestown	.....	.....	.....	2.74	14.0
Keene Valley	50	—20	18.4	2.15	11.5
Kings Station	.....	.....	.....	5.90	.....
Lake George	48	—24	18.3	3.01	17.0
Lake Placid	50	—25	17.4	1.90	15.0
Little Falls	56	—16	18.2	1.66	13.0
Lockport	52	— 4	24.9	.....	.....
Lowville	49	—27	17.6	3.64	17.0
Lyndonville	.....	.....	.....	0.56	.....
Lyons	57	0	26.0	0.92	5.0
Madison Barracks	.....	.....	.....	1.60	14.0
Middletown	50	— 1	24.0	3.23	2.5
Milford	.....	.....	.....	.....	
Mohonk Lake [1]	44[e]	— 8	22.9	.....	.....
Mount Morris	.....	.....	.....	1.30	10.0
Napoli	.....	.....	.....	1.90	.....
Newark Valley	.....	.....	.....	1.83	.....
New Lisbon	51	—25	18.7	1.46	10.2
Niagara Falls	.....	.....	.....	1.76	.....
North Hammond	50	—18	19.8	2.02	5.0
North Lake	46	—25	12.9	3.43	22.0
Number Four	45	—27	15.6	4.53	33.8
Nunda	52	—12	23.2	1.61	8.5
Ogdensburg	54	—20	17.6	1.13	3.0
Oneonta [1]	45[e]	—14	22.5	2.33	.....
Oxford	48	—22	21.2	2.22	12.6
Palermo	51	—12	21.2	1.58	5.0
Penn Yan	55	— 6	23.9	1.70	10.6
Perry City	47	—12	20.0	2.03	14.6
Phenix	.....	.....	.....	1.52	.....
Plattsburg Barracks	44	—18	16.5	2.70	.....
Port Jervis	49	—12	23.6	2.84	9.0
Poughkeepsie	51[e]	—20	25.4	2.37	.....
Primrose	52	—12	27.2	4.34	6.5
Ridgeway	58	— 5	24.8	1.52	5.3
Rome	48	—18	17.2	3.11	.....
Romulus	56	— 3	24.6	1.24	8.0
Rose	.....	.....	.....	0.75	.....
St. Johnsville	52	—13	20.5	2.26	13.2
Saranac Lake	52	—35	13.2	2.22	16.5
Saratoga Springs	47	—28	18.4	2.74	16.5
Schenectady	48	—13	20.7	.....	.....
Setauket	54	5	30.8	4.71	3.5
Sherwood	.....	.....	.....	1.04	.....
Skaneateles	.....	.....	.....	1.20	.....
South Canisteo	55	—16	22.0	1.99	11.4
Southeast Reservoir	.....	.....	.....	3.78	.....
South Kortright	53	—19	20.6	.....	.....
Straits Corners	49	—15	20.4	1.71	8.0
Ticonderoga	.....	.....	.....	2.51	13.2
Victoria	57[d]	— 3[d]	23.6[d]	1.94	10.0
Wappingers Falls	53	—18	24.5	3.69	6.0
Warwick	.....	.....	.....	2.79	.....
Watertown	56	—23	20.7	3.36	26.0
Waverly	54	—13	21.8	1.77	11.9
Wedgwood	51	— 7	21.6	1.72	12.0
West Berne	42	—18	19.5	1.85	16.5
Westfield	59	— 9	26.4	.....	.....
Westpoint	60	—15	27.4	3.50	.....
Willetspoint	54	4	30.6	4.59	5.0
North Carolina.					
Abshers	65	9	38.8	4.32	1.0
Asheville	.....	.....	.....	2.17	2.3
Beaufort	68	22	48.0	5.50	T.
Biltmore	68	12	38.9	1.98	3.0
Bryson City	.....	.....	.....	4.44	4.0
Chapel Hill	70	13	38.8	3.71	8.0
Edenton	64	16	41.9	5.15	6.5
Experimental Farm	72	13	41.2	3.47	9.0
Fairbluff	.....	.....	.....	3.89	17.7
Fayetteville	75	14	42.8	3.60	7.5
Flatrock	62[g]	10[g]	36.4[g]	4.29	2.0
Greensboro	62	13	37.5	3.55	5.0
Henderson	69	11	38.6	4.36	7.5
Hendersonville	66	11	38.2	3.75	1.5
Horse Cove	56	14	37.7	5.76	6.4
Lenoir [*1]	58	18	38.1	3.94	1.5
Linville	56	8	33.3	3.38	9.5
Littleton	70	10	37.4	3.69	7.0
Louisburg	73	8	39.0	3.70	9.8
Lumberton	74	19	41.7	4.22	7.0
Mana	.....	.....	.....	4.92	5.8
Marion	66	14	39.0	3.89	2.8
Marshall	65	13	39.1	2.11	4.0
Mocksville	69	14	41.3	5.24	6.5
Moncure	74	17	42.9	2.90	6.5
Monroe	69	15	41.0	3.68	8.0
Morganton	.....	15	.....	3.84	3.0
Mountairy	62[d]	11[g]	36.2[g]	4.18	5.5
Mount Pleasant	66	16	40.8	4.46	7.5
Murphy	.....	.....	.....	4.02	1.5
Oakridge	61	12	36.0	7.44	6.6
Pantego	.....	.....	.....	3.52	.....
Patterson [*1]	60	16	35.3	3.52	2.2
Pittsboro	71	12	39.9	3.42	6.2
Rockingham	75	17	41.7	4.57	7.0
Roxboro	63	5	35.8	.....	12.0
Salem	60	13	37.9	4.91	6.0
Salisbury	65	11	41.2	2.35	11.0
Saxon	63	10	37.7	5.78	8.0
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Selma	74	8	40.8	5.67	7.0
Settle	58	12	35.6	4.92	4.5
Sloan	75	16	45.6	3.92	3.0
Soapstone Mount	67	5	38.0	3.72	7.0
Southern Pines *a*	75	15	45.0	3.79	5.0
Southern Pines *b*	75	15	44.3	.....	.....
Southport	66	19	47.4	4.37	
Springhope [*1]	67	14	39.2	2.50	8.0
Tarboro	77	13	41.4	3.64	6.8
Washwoods	.....	.....	.....	3.79	4.0
Waynesville	60	.....	.....	3.52	2.8
Weldon	72	8	38.6	2.88	7.0
North Dakota.					
Amenia	38	—29	4.6	0.18	1.8
Ashley	42	—27	8.9	T.	T.
Berlin	40	—30	6.1	0.18	1.8
Bottineau	32	—35	—2.2	0.75	7.5
Buxton	36	—30	1.8	0.05	0.5
Coal Harbor	45	—26	5.7	T.	T.
Devils Lake	43	—33	2.2	0.10	1.0
Dickinson	45	—27	10.2	0.12	1.2
Dunseith	34	—37	2.2	.....	.....
Ellendale	42	—24	11.4	T.	T.
Fargo	39	—30	4.0	0.29	2.9
Fort Berthold	55	—26	9.8	0.20	2.0
Fort Yates	.....	.....	.....	0.32	T.
Fullerton	44	—26	7.4	0.34	2.5
Gallatin	37	—34	3.4	0.21	2.1
Glenullin	41	—26	7.6	T.	T.
Goetz	47	—30	5.4	0.35	3.5
Grafton	33	—31	0.0	0.24	2.4
Hamilton	36	—41	—2.8	1.14	7.4
Jamestown	40	—33	7.2	0.11	1.1
Kelso	39	—31	5.6	.....	.....
Larimore	35	—32	1.1	T.	T.
McKinney	38	—34	—1.2	0.17	1.7
Medora	52	—32	14.0	0.10	1.0
Melville	38	—31	5.8	0.10	1.0
Milton	32	—37	—0.6	0.50	5.0
Minnewaukon	36	—35	1.2	0.13	1.3
Minot	50	—28	5.2	0.30	3.0
Napoleon	43	—30	7.0	0.40	4.0
New England City	43	—32	13.5	0.15	1.5
Oakdale	45	—18	14.4	0.19	1.9
Portal [f]	37	—33	1.4	.....	.....
Power	42	—31	6.3	.....	.....
Sheyenne	37	—34	4.5	0.11	1.1
Steele	43	—26	5.4	T.	T.
Towner	39	—33	2.3	.....	.....
University	46	—28	3.0	0.60	6.0
Wahpeton	42	—28	10.3	0.36	3.6
Washburn	48[h]	—29	10.5[f]	0.10	1.0
Woodbridge	33	—37	—2.0	0.36	1.6
Ohio.					
Akron	56	— 3	26.8	2.98	6.7
Annapolis	.....	.....	.....	1.44	6.0
Ashland	55	— 4	26.4	2.16	9.5
Ashtabula	58	— 9	25.6	3.12	10.0
Atwater	.....	.....	.....	2.43	7.5
Bangorville	65	— 8	25.0	3.69	4.0
Basil	.....	.....	.....	1.96	1.5
Bement	.....	.....	.....	1.73	5.6
Benton Ridge	54	— 5	25.6	3.70	9.0
Bethany	58	0	30.6	3.54	4.0
Bigprairie	56	— 4	27.4	3.35	5.8
Binola	.....	.....	.....	3.39	11.8
Bloomingburg	58	1	28.8	2.75	7.0
Bowling Green	55	— 1	26.7	2.17	2.8
Bucyrus	58	— 8	26.1	.....	2.0
Cambridge	61	— 6	27.3	2.17	5.0
Camp Dennison	60	4	31.2	3.71	6.9
Canal Dover	59	0	27.4	3.28	8.5
Canton	58	— 1	28.8	2.12	8.2
Carrollton	61	— 3	27.8	2.33	10.0
Cedarville	.....	.....	.....	3.30	4.2
Celina	54	—11	26.2	2.76	2.0
Circleville	62	4	30.1	2.42	6.0
Clarksville	60	2	31.1	3.47	5.3
Cleveland *a*	57	— 2	27.6	3.24	10.5
Cleveland *b*	65	1	25.8	2.40	3.2
Coalton	64	— 8	28.0	3.60	14.0
Colebrook	56	—15	25.1	2.60	6.5
Dayton *a*	59	— 2	31.2	3.51	4.1
Dayton *b*	.....	.....	.....	3.83	7.7
Defiance	53	— 9	25.6	2.08	2.5
Delaware	58	— 4	28.4	3.02	5.8
Demos	60	— 3	26.6	2.08	8.0
Dupont	.....	— 7	.....	1.80	4.0
Elyria	56	— 8	25.8	1.89	.....
Findlay	54	0	26.6	3.19	5.0
Frankfort	65	1	31.2	3.20	10.5
Garrettsville	57	—15	25.4	2.81	8.3
Granville	59	0	28.5	2.41	5.5
Gratiot	58	3	27.9	2.53	9.3
Greenfield	61	7	33.0	2.30	9.0
Greenhill	59	— 6	25.7	1.88	8.8

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Greenville	53	— 5	27.0	3.65	3.0
Hackney	49	0	28.3	3.60	22.0
Hanging Rock	63	— 6	32.4	6.53	7.0
Hedges	53	— 9	26.1	2.88	7.5
Hillhouse	57	—11	24.5	2.84	9.0
Hillsboro	61	— 1	31.0	2.95	11.0
Hiram	56	— 7	25.3	3.06	6.5
Hudson	55	—11	25.1	2.70	7.0
Jacksonboro	56	— 4	28.6	4.68	9.0
Kenton	58	— 6	28.2	3.46	6.0
Killbuck	56	— 3	27.5	1.75	6.8
Lancaster	60	3	29.8	3.64	2.2
Leipsic	53	— 8	26.3	2.57	2.0
Levering	53	— 6	24.5	3.84	4.0
Logan	63	— 1	31.4	1.88	7.5
Lordstown	56	—11	23.8	2.03	7.5
McArthur	64	— 8	29.0	3.25	11.0
McConnelsville	63	— 4	30.9	2.94	9.5
Mansfield				3.61	9.0
Marietta *b*	64	— 3	32.9	3.64	11.0
Marion	56	— 3	28.4	2.97	5.5
Medina	57	—14	25.4	3.60	9.0
Milfordton				2.93	7.0
Milligan	62	— 5	29.6	2.33	7.0
Millport	60	— 6	25.9	2.61	9.0
Montpelier	52	—12	23.6	2.09	5.8
Napoleon	55	—10	25.3	1.25	2.0
Neapolis				2.49	3.0
New Alexandria	61	0	28.1	3.65	13.0
New Berlin	56	— 7	26.2	2.13	4.0
New Holland	62	2	29.0	2.54	10.2
New Paris	55	— 6	28.7	3.46	2.3
New Waterford	54	0	27.0	2.68	12.0
North Lewisburg	60	— 6	26.8	3.75	7.0
North Royalton	55	—12	26.1	2.73	6.0
Norwalk	57	—10	27.0	3.63	6.5
Oberlin	57	—11	26.6	2.80	.....
Ohio State University	62	0	30.0	2.86	5.7
Orangeville	58	—12	23.4	2.05	8.0
Ottawa	54	— 8	26.8	2.84	6.5
Pataskala	60	— 1	28.3	2.39	6.8
Perry				2.82	7.0
Philo	60	— 1	28.0	2.03	7.8
Plattsburg	57	— 3	28.2	3.61	5.0
Point Marblehead *10	60	1	29.2	.....	.....
Pomeroy	61	— 8	32.0	4.61	15.0
Portsmouth *a*				5.00	13.0
Portsmouth *b*	66	1	34.4	4.70	11.0
Pulse				4.17	15.2
Richwood	60	— 7	29.6	3.48	7.5
Ridgeville Corners	53	—10	25.8	2.28	3.0
Ripley	63	3	31.6	4.06	19.4
Rittman	54	— 9	25.4	3.38	4.2
Rockyridge	55	— 7	26.3	2.53	4.0
Rosewood	55	— 6	27.1	3.65	3.0
Seaman	61	1	29.3	3.44	11.2
Shenandoah	55	—10	25.0	3.15	7.4
Sidney	55	— 3	26.4	3.28	4.2
Sinking Spring				4.47	14.5
Somerset	60	3	30.8	2.37	7.9
Springboro				3.20	.....
Strongsville				3.65	7.0
Sylvania	51	—10	24.1	2.62	6.0
Thurman	65	— 9	32.2	3.05	5.0
Tiffin	56	— 4	27.2	3.72	7.8
Upper Sandusky	55	— 6	28.0	3.20	7.0
Urbana	55	— 3	26.8	2.00	6.2
Vanceburg	65	3	33.4	5.16	8.5
Vanwert	55	— 8	26.2	2.25	3.5
Vermillion	56	— 5	26.8	3.77	10.0
Vickery	55	— 6	27.2	3.23	4.6
Walnut				2.32	7.3
Warren	58	— 7	26.4	2.98	9.2
Warsaw	60	— 3	28.4	3.06	9.5
Wauseon	53	—13	25.1	3.90	5.0
Waverly	62	— 3	30.8	4.28	14.4
Waynesville	54	0	27.8	3.68	5.0
Wellington	56	— 9	26.4	3.24	8.0
Westerville	57	0	30.0	3.05	6.4
Willoughby				2.78	8.0
Wooster *b*	55	— 6	26.6	3.29	7.2
Zanesville				2.09	5.8
Oklahoma.					
Anadarko	70	2	38.6	0.47	T.
Arapaho	65	— 1	35.2	0.17	1.7
Beaver	56	—10	29.6	0.15	1.5
Burnett	68	1	35.6	0.68	0.8
Clifton	66	— 2	34.5	1.28	1.8
Edmond		— 1		0.83	.....
Fort Sill	69	3	35.2	0.15	0.8
Guthrie	65	0	36.6	0.66	3.0
Hennessey				0.50	5.0
Hopeton	67	— 6	32.4	0.40	3.2
Jefferson	72	— 4	35.0	0.00	0.0
Kingfisher	67	— 2	35.8	0.52	1.2
Mangum	68	2	35.7	0.40	2.0
Oklahoma—Cont'd.					
Norman	66	0	37.2	0.62	1.2
Pawhuska	65	— 1	34.2	3.14	8.0
Perry *b	64	— 7	31.8	0.76	2.8
Prudence	71	— 5	33.0	0.32	2.8
Putnam	66[d]	1[d]	33.3[d]	0.44	4.5
Sac and Fox Agency †	67	— 4	36.3	1.35	1.0
Stillwater	67	— 2	37.0	0.48	2.5
Waukomis	66	— 5	35.4	T.	T.
Winnview	65[e]	— 4[e]	34.9[e]	0.40	4.0
Oregon.					
Albany *a*	61	29	44.2	5.80	T.
Albany *b*				5.56	.....
Arlington	60	0	33.6	2.31	75.8
Ashland *b*	56	27	39.4	2.63	2.9
Aurora *1	58	25	41.8	10.12	2.0
Aurora (near)	58	22	41.5	6.45	3.5
Bandon	57	36	47.4	7.43	
Bay City	55	28	43.8	23.53	
Beulah	52	1	28.6	1.55	21.0
Brownsville *1	58	32	43.3	5.36	
Burns	48	— 4	25.4	1.90	19.0
Burns (near)	60	15	36.4	.....	.....
Cascade Locks	54	15	35.8	15.34	.....
Comstock *1	62	33	43.8	8.13	2.0
Coquille River				5.57	
Corvallis	58	28	42.7	6.26	0.1
Dayville	61	15	37.6	2.52	9.2
Ella				1.52	13.0
Eugene				5.32	
Fairview	61	32	45.6	12.36	1.0
Falls City	55	29	41.0	15.69	1.1
Forestgrove	58	20	39.0	8.58	6.7
Gardiner	58	36	46.5	13.06	
Glenora	59	28	40.8	30.08	8.0
Government Camp	50	8	31.6	20.79	72.0
Grants Pass *a*	58	26	41.2	5.50	1.0
Happy Valley	55	3	33.6	1.39	6.5
Heppner	58	4	36.2	1.52	11.0
Hood River (near)	55	8	34.4	7.55	46.0
Jacksonville	53	27	39.2	4.55	2.5
Joseph	51	— 3	27.6	0.75	7.5
Junction City *1	66	30	44.6	4.64	
Kerby	62	26	41.2	12.49	4.0
Klamath Falls	52	13	32.7	3.22	20.0
Lafayette *1	58	28	40.8	9.24	
Lagrande	58	4	34.5	2.84	12.0
Langlois	78	34	50.0	12.31	
Lonerock	56	1	34.6	2.43	17.0
McMinnville	55	27	41.8	8.26	4.5
Merlin *1	58	28	37.2	6.95	
Monmouth *b*	58	28	42.9	4.02	T.
Monroe	58	27	41.6	8.55	0.1
Mount Angel	58	18	42.6	5.38	1.0
Nehalem				24.04	1.3
Newberg	58	29[h]	43.2[i]	6.86	2.0
Newbridge	50	15	32.4	1.73	8.0
Newport	55	22	44.2	13.24	
Pendleton	62	— 6	35.9	1.78	11.3
Placer				8.11	.....
Prineville	57	18	36.0	.....	.....
Riddles *1	58	28	43.0	3.16	2.5
Riverside	53	3	32.9[e]	1.68	17.5
Salem	68	26	44.4	5.76	.....
Sheridan *1	64	31	40.4	5.98	2.0
Silver Lake	60	10	33.0	1.40	T.
Silverton *1	60	24	45.0	5.65	1.2
Siskiyou *1	60	22	38.0	5.90	51.0
Sparta	48	9	29.6	.....	.....
Springfield *1	60	31	43.1	4.35	1.0
Stafford	56	21	40.4	8.06	6.0
The Dalles	62	9	34.6	2.82	24.2
Tillamook Rock				10.06	
Toledo	61	30	45.2	13.80	
Umatilla				1.53	16.8
Vale	49	4	30.5	1.92	11.5
Vernonia	59	21	39.1	8.65	13.0
West Fork *1	54	30	40.6	3.07	2.0
Weston	55	—10	33.2	4.15	16.5
Williams	57	27	40.4	5.59	7.0
Pennsylvania.					
Altoona	58	—12	25.0	2.41	.....
Aqueduct	53	— 7	28.3	2.59	10.8
Athens	52	— 8	22.4	2.53	11.5
Beaver Dam				1.88	10.3
Bethlehem				3.65	.....
Brookville				2.70	13.9
Browers Lock				4.84	.....
Cameron				2.00	14.0
Carlisle	49	— 8	26.4	3.41	12.0
Cassandra	59	— 8	27.2	2.87	12.5
Cedarrun				3.50	16.0
Centerhall	52	—12	26.2	2.07	9.5
Chambersburg	51	—15	26.5	1.82	.....
Coatesville	55	— 7	29.8	3.57	3.8
Confluence		—13		4.37	14.0
Coopersburg	55	— 8	29.4	4.73	12.5
Pennsylvania—Cont'd.					
Davis Island Dam				2.51	11.1
Derry Station	64	—17	28.7	4.25	16.5
Doylestown				4.02	.....
Driftwood				1.85	.....
Duncannon				2.43	8.8
Dushore	49	—21	22.0	1.94	3.8
Dyberry	50	—19	20.6	2.09	11.5
East Bloomsburg				0.63	1.2
East Mauch Chunk	49	— 9	24.5	3.07	8.8
Easton	50	— 3	26.6	4.03	8.0
Ellwood Junction				2.22	9.7
Emporium	58	—12	23.4	2.91	19.4
Everett	57	—15	28.2	2.48	9.0
Farrandsville				2.21	14.0
Forks of Neshaminy *1	50	2	29.7	4.25	.....
Franklin	62	—18	25.7	0.82	8.2
Frederick				2.84	.....
Freeport				3.27	14.3
Girardville				2.76	8.2
Grampian	52	—12	22.6	3.12	15.0
Greensboro	65	— 3	31.6	3.97	16.6
Hamburg	48	— 6	26.2	4.41	.....
Hawley	54	—17	23.2	3.52	4.4
Hews Island Dam				2.78	16.5
Huntingdon *a*	57	—17	28.2	2.61	11.5
Huntingdon *b*				2.10	17.4
Irwin				3.31	33.1
Johnstown	61	— 8	29.3	4.16	15.8
Karthaus				2.35	16.0
Keating				2.35	11.0
Kennett Square	54	— 6	30.6	4.82	7.2
Lansdale				3.44	.....
Lawrenceville	53			1.85	.....
Lebanon	50	—14	26.3	3.67	15.0
Leroy	50	— 8	21.5	2.19	10.0
Lewisburg	50	—20	25.0	2.55	11.2
Lock Haven *a*	53	—14	26.7	2.79	9.5
Lock Haven *b*				2.16	10.0
Lock No. 4				3.13	14.0
Lycippus	66	0	28.8	3.65	13.5
Mifflin				2.60	9.0
Nisbet				1.76	3.8
Oil City				2.57	8.8
Ottsville				2.32	.....
Parker				2.03	9.2
Philadelphia	55	6	32.4	4.13	6.9
Quakertown	51	—13	27.0	3.74	7.0
Reading [2]			27.0	3.41	.....
Renovo *a*				1.92	.....
Renovo *b*	59	— 6	26.2	2.65	14.8
Ridgway				2.04	14.0
Saegerstown	57	—18	27.4	2.67	11.6
St. Marys		—11			
Salem Corners	49	—10	23.6	3.10	12.0
Scranton	51	—15	24.1	3.03	6.0
Selsholtzville				4.13	.....
Selinsgrove	50	—13	25.9	1.76	9.5
Shawmont				3.86	3.4
Shinglehouse				1.18	8.0
Sinnamahoning				1.23	.....
Smethport	53	—15	22.2	2.30	8.0
Smiths Corners				4.13	.....
Somerset	58	—13	24.4	4.20	19.2
South Eaton	55	—14	24.7	1.98	5.0
State College	56	— 9	25.0	2.60	12.9
Sunbury				2.10	.....
Swarthmore	54	— 2	29.3	3.25	8.0
Towanda	53	—15	24.0	1.80	9.0
Trout Run				2.38	10.5
Uniontown	63	— 8	30.8	4.28	18.5
Warren	55	—14	24.4	3.40	12.8
Wellsboro	52	—12	23.3	3.42	9.0
West Chester	54	1	30.3	4.71	8.8
Westtown	55	— 5	28.3	4.98	6.0
White Haven	56	—14	21.9	2.15	5.5
Wilkesbarre	59	— 6	26.3	3.21	11.0
Williamsport	55	— 9	26.5	1.46	5.0
York	55	—11	28.7	3.61	9.2
Rhode Island.					
Bristol	48	2	29.6	5.54	4.5
Kingston	54	— 6	28.2	5.66	2.2
Lonsdale				5.46	5.0
Pawtucket	54	1	29.7	5.54	6.2
Providence *a*	54	— 2	30.3	5.18	4.5
Providence *c*	54	— 5	28.6	5.40	6.0
South Carolina.					
Anderson				6.40	2.0
Batesburg	75	22	45.6	5.55	1.9
Beaufort	71	29	50.4	3.93	
Blackville	76	24	45.6	5.01	T.
Camden				5.32	5.5
Central	65	21	41.8	5.31	0.5
Cheraw *a*	76	19	41.7	5.09	7.2
Cheraw *b*				4.87	5.0
Clemson College	66	19	42.2	5.61	0.5
Conway				3.81	2.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Darlington	.....	.....	.....	3.17	3.0
Edisto	.....	.....	.....	4.42	2.5
Effingham	.....	.....	.....	5.44	3.0
Florence	75	21	44.0	4.51	0.8
Gaffney	.....	.....	.....	4.89	8.0
Georgetown	74	22	46.6	3.00	
Gillisonville	78	27	47.8	4.75	T.
Greenville	68	19	40.2	5.78	2.0
Greenwood	69	21	41.4	5.30	4.0
Holland	65	19	40.8	6.95	3.0
Kingstree *a*	75	22	47.1	3.29	3.5
Kingstree *b*	.....	.....	.....	3.30	3.7
Little Mountain	71	17	42.7	4.63	8.5
Longshore	69	19	42.1	5.28	7.0
Mount Carmel	.....	.....	.....	5.83	2.9
Pinopolis *[1]	70	26	47.2	3.71	
St. Georges	76	24	46.0	3.58	2.0
St. Matthews	75	23	45.2	4.28	2.5
St. Stephens	.....	.....	.....	3.80	2.1
Santuck	67	18	41.8	4.12	3.5
Shaws Fork	73	24	41.8	6.31	3.0
Smiths Mills	.....	.....	.....	3.41	2.2
Society Hill	74	21	42.9	4.03	7.0
Spartanburg	65	25	43.1	6.65	7.5
Statesburg	77	21	46.6	5.04	4.0
Summerville	74	23	48.4	5.11	
Temperance	76	19	44.2	3.13	2.5
Trenton	69	24	47.5	5.45	3.0
Trial	76	21	45.8	4.65	T.
Winnsboro	66	18	42.6	4.10	6.5
Yemassee	76	25	47.2	4.44	
Yorkville	66	21	43.4	5.01	6.0
South Dakota.					
Aberdeen	45	−26	11.2	0.35	1.0
Alexandria	54	−23	18.9	0.35	3.0
Armour	56	−23	18.2	0.29	2.0
Ashcroft	53	−30	17.8	0.59	5.5
Bowdle	60	−31	9.0	T.	T.
Brookings	47	−27	15.3	0.25	.....
Canton	51	.....	.....	0.06	0.2
Centerville	.....	.....	.....	0.54	5.1
Chamberlain	57	−17	21.3	0.22	.....
Chandler	57	−21	20.1	0.48	1.3
Clark	.....	.....	.....	0.43	1.5
Desmet	68	−28	15.4	0.75	4.0
Doland	49	−30	14.4	0.59	2.0
Elkpoint	56	−20	21.6	0.14	1.5
Farmingdale	.....	.....	.....	0.23	0.3
Flandreau	49	−26	16.4	0.24	0.8
Forestburg	50	−26	15.8	T.	T.
Forest City	62	−26	15.1	0.20	2.0
Fort Meade	54	−20	18.8	0.91	9.1
Gann Valley	56	−27	16.5	T.	T.
Goudyville	48	−27	13.4	0.22	1.0
Harney	56°	−18°	19.7°	0.32	3.8
Highmore	50	−27	13.6	0.45	4.5
Hotch City	56	−24	19.4	0.06	T.
Howard	50	−28	16.5	0.50	1.5
Interior	55	−19	19.4	0.10	1.0
Ipswich [1]	45*	−24	11.1	0.22	1.0
Kimball	54	−25	19.4	0.54	3.0
Leslie	58	−21	17.1	0.10	0.5
Menno	56	−23	18.3	0.44	2.5
Millbank	48	−22	13.1	0.13	1.3
Mitchell	55	−24	18.8	0.21	.....
Montrose	48	−27	16.8	0.23	1.0
Nowlin	57	−21	17.8	0.34	2.0
Oelrichs	56	−17	18.8	1.00	7.5
Parker	53	−23	17.4	0.10	1.0
Plankinton	55	−25	16.4	0.20	1.2
Redfield	49	−31	14.6	0.15	0.2
Rochford	54	−25	20.9	2.65	26.5
Rosebud	56	−21	18.6	0.96	11.0
Shiloh	50	−22	17.6	0.63	1.0
Silver City	.....	.....	.....	1.65	16.5
Sioux Falls	50	−27	14.8	0.15	1.5
Spearfish	57	−15	23.2	0.42	11.5
Tyndall	52	−22	17.0	0.51	4.0
Watertown	45	−28	12.2	0.20	.....
Waubay	45	−30	9.4	0.19	T.
Wentworth	47	−26	16.0	0.29	1.7
Wessington Springs	50	−22	14.0	T.	T.
Whiteswan	58	−18	21.4	0.26	2.1
Wolsey	.....	.....	.....	0.41	2.0
Tennessee.					
Andersonville	62	12	37.4	4.54	4.0
Ashwood	63	7	39.8	5.96	4.2
Benton (near)	65	13	41.6	2.66	T.
Bluff City	.....	.....	.....	2.74	4.0
Bolivar	64	3	37.6	7.13	3.5
Bristol	65	12	36.0	3.02	3.0
Byrdstown	62	6	37.2	6.72	7.8
Carthage	65	9	39.6	6.05	3.0
Charleston	.....	.....	.....	4.75	.....
Clarksville	64	4	37.6	7.90	10.5
Clinton	.....	.....	.....	4.64	5.0

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum	Mean.	Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Decatur	62	14	39.3	4.41	2.0
Dover	64[f]	5[f]	40.1[f]	7.46	8.5
Elizabethton	68	13	37.2	3.13	5.0
Elk Valley	.....	7	.....	7.14	8.0
Erasmus	60	9	35.9	6.40	5.0
Florence	64	9	38.9	5.84	7.0
Franklin	63	5	37.8	5.49	5.2
Grace *[1]	58	8	35.8	4.30	10.0
Greeneville	64	12	39.0	3.10	7.7
Harriman	64	15	37.4	4.94	2.5
Hohenwald	61	5	36.9	5.90	4.3
Jackson	72	7	39.2	6.19	5.0
Johnsonville	63	4	38.0	6.49	5.0
Jonesboro *[1]	65	15	36.9	2.79	6.2
Kingston	.....	.....	.....	4.08	3.0
Lafayette *[5]	60	9	35.6	8.30	6.0
Liberty	64	8	40.0	7.42	4.0
Lynnville	64	13	38.6	6.03	2.0
McMinnville	64	9	38.2	7.46	2.5
Madison	69	− 2	37.9	6.22	7.0
Maryville *[5]	62	14	39.2	4.83	4.5
Newport	70	13	39.4	3.12	5.5
Nunnelly	63	0	38.2	5.50	7.3
Oak Hill	63	7	39.3	8.18	13.0
Palmetto	65	8	40.0	6.47	5.0
Peryear *[5]	60	6	38.2	5.00	8.0
Pope	63	1	37.6	6.44	5.1
Rogersville	63	14	37.8	3.44	3.0
Rugby	57	3	35.4	6.56	12.0
St. Joseph	66	10	39.4	3.68	2.0
Savannah	61	6	39.6	5.42	1.5
Sewanee	57	11	38.5	5.73	1.5
Silverlake	60	9	35.2	2.06	5.5
Springdale	64	10	40.4	3.85	6.5
Springfield	68	1	37.8	7.80	6.5
Sylvia	62	0	36.9	7.03	5.2
Tazewell	.....	.....	.....	4.66	4.5
Tellico Plains	65	11	41.6	4.24	1.0
Tracy City	58	7	36.8	6.41	1.5
Trenton	63	3	38.1	6.60	9.5
Tullahoma	62	8	38.6	6.77	5.0
Union City	60	1	36.0	8.75	16.0
Waynesboro	62	6	38.2	4.30	2.0
Wildersville	62	6	38.7	7.95	5.5
Yukon	62	7	40.2	8.21	0.5
Texas.					
Alvin	.....	.....	.....	8.83	
Anna	69	8	42.6	3.13	0.5
Anson	.....	.....	.....	0.45	2.0
Austin *a*	75	20	45.6	0.80	T.
Austin *b* *[5]	68	16	44.5	.....	.....
Ballinger	74	11	41.5	0.10	0.5
Beaumont	26	.....	.....	2.00	
Beeville	79	22	51.6	2.55	
Blanco	74	.....	.....	0.20	
Boerne *[1]	73	19	48.6	0.42	
Brazoria	75	25	52.0	8.68	
Breckenridge	72	9	42.2	T.	T.
Brenham	71	20	48.0	3.45	
Brighton	82	26	56.8	0.89	
Brownwood	.....	.....	.....	T.	T.
Burnet *[1]	70	15	50.0	0.82	1.0
Camp Eagle Pass	.....	20	.....	0.00	
Coleman	78	10	43.2	1.30	2.0
College Station [2]	72	.....	47.0	4.42	
Colorado	.....	.....	.....	0.56	1.0
Columbia	74	23	50.7	8.86	
Conroe	73	24	49.4	3.44	
Corsicana *b*	71	13	44.8	1.32	T.
Cuero	.....	.....	.....	5.91	
Dallas	70	12	41.3	2.01	T.
Danevang	77	22	52.0	5.96	
Dublin	71	9	41.3	0.66	
Duval	76	18	49.8	1.82	T.
Emory	.....	4	.....	3.08	T.
Estelle	70	9	42.8	1.98	0.7
Forestburg	.....	.....	.....	0.94	0.5
Fort Brown	86	32	59.0	0.46	
Fort McIntosh	84	29	55.8	0.00	
Fort Ringgold	91	29	56.6	0.00	
Fredericksburg *[1]	71[d]	16°	45.1[d]	0.36	
Fruitland	70	6	41.2	1.18	1.0
Gainesville	68	11	40.6	1.70	1.9
Georgetown *[1]	74[d]	18	45.4[d]	0.63	0.4
Golindo	.....	.....	.....	1.45	
Hale Center	71	10	40.6	0.15	1.5
Hallettsville	77	22	50.8	3.94	
Hewitt	.....	.....	.....	0.60	T.
Honeygrove	.....	.....	.....	4.34	2.5
Houston	75	27	50.0	4.59	
Hulen	76	25	52.7	9.69	
Huntsville	74	18	47.6	3.08	
Jacksonville	71	15	47.5	4.19	T.
Jasper	85	24	53.4	4.72	2.0
Junction	.....	.....	.....	0.00	
Kent	.....	.....	.....	0.13	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Texas—Cont'd	°	°	°	*Ins.*	*Ins.*
Kerrville	74	14	44.6	0.11	
Lampasas	71	12	44.6	0.28	0.5
Langtry	.....	.....	.....	0.00	
Llano *[5]	73	20	47.5	0.05	0.5
Longview	71	18	44.6	4.09	
Luling	76	20	49.0	1.18	
Mann	66[d]	15°	40.0°	1.30	
Marshall	72	18	46.8	2.33	0.1
Menardville	.....	.....	.....	0.00	
Mount Blanco	70	6	37.2	0.30	3.0
New Braunfels	74	21	48.9	0.31	
Panter	.....	.....	.....	0.67	T.
Point Isabel *[1]	80	36	62.1	T.	
Rheinland	71	8	39.6	0.46	1.5
Roby	80	6	43.8	1.30	2.5
Rock Island	.....	.....	.....	4.45	
Rockport *[1]	69	36	57.3	.....	
Rock Springs	.....	.....	.....	0.00	
Runge	85	21	53.2	2.68	
Sabine Pass	73	31	52.4	8.91	
San Antonio	77	20	51.7	0.40	
Sanderson	73	12	45.7	0.00	
San Marcos	68	19	43.0	0.46	
Sherman	72	13	42.7	2.25	
Temple *a*	72	11	44.2	0.82	
Temple *b*	74	15	47.4	0.70	
Topaz	78°	9[b]	45.6°	0.70	0.5
Tulia	68	1	35.5	0.55	5.5
Tyler	67	12	41.9	5.29	
Victoria	.....	.....	.....	4.75	
Waco	74	15	45.8	1.00	T.
Waxahachie	69	10	43.0	1.41	0.1
Weatherford	68	9	41.8	0.98	T.
Wichita Falls	.....	.....	.....	1.63	3.5
Utah.					
Alpine	.....	.....	.....	2.36	.....
Blue Creek *[1]	48	9	29.4	2.28	11.5
Brigham	.....	.....	.....	2.72	.....
Corinne	48	− 4	30.8	2.25	22.5
Fillmore	57	4	31.0	0.50	.....
Fort Duchesne	52	−17	17.2	0.20	2.0
Frisco	54	11	33.0	0.10	1.0
Giles	59	− 3	23.7	0.28	4.5
Grover	51	− 7	24.1	0.10	1.0
Heber	50	−15	23.4	2.45	24.5
Huntsville	.....	.....	.....	3.96	31.0
Levan	52	− 7	27.2	1.43	14.3
Loa	.....	.....	.....	0.40	4.0
Logan	48	10	29.0	1.20	.....
Manti	56	− 8	26.4	1.90	19.0
Millville	.....	.....	.....	1.50	.....
Minersville	55	3	31.3	0.57	5.5
Moab	59	4	28.2	0.48	4.8
Mount Pleasant	53	− 4	27.0	1.40	14.0
Ogden *a* *[1]	53	15	33.2	1.25	12.5
Pahreah	60	2	32.2	0.70	7.0
Parowan	55	0	30.2	0.12	1.2
Pinto	53	− 9	27.7	0.25	.....
Promontory *[1]	45	4	25.9	.....	.....
Provo	54	2	32.8	1.54	.....
Richfield	62	0	31.6	0.30	3.0
St. George	70	8	37.5	0.32	.....
Scipio	51	−10	26.4	1.40	5.0
Snowville	44	− 1	27.3	1.45	11.0
Soldier Summit	48	−11	22.8	1.70	17.0
Terrace *[1]	37	0	16.9	0.75	7.5
Tooele	.....	.....	.....	0.27	.....
Tropic	59	− 2	26.5	1.40	13.0
Vernal	48	9	22.3	0.40	4.6
Vermont.					
Bennington	59	−26	22.4	2.85	11.0
Brattleboro	48	−23	20.6	2.96	13.2
Burlington	44	−11	20.6	1.12	7.0
Chelsea	49	−17	16.4	2.85	15.0
Cornwall	52	−16	20.0	1.20	8.0
Derby	51	−21	15.2	1.78	14.8
Enosburg Falls	52	−22	17.4	2.30	14.0
Hartland	49	−27	16.1	2.71	14.0
Jacksonville	44	−25	17.8	2.22	9.0
Norwich	54	−25	17.3	2.45	14.0
St. Johnsbury	47	−29	13.8	2.22	13.5
Vernon *[6]	46	−27	19.6	3.15	10.0
Wells	52	−20	18.0	1.85	10.5
Woodstock	50	−31	12.6	1.85	13.0
Virginia.					
Alexandria	58	3	32.6	4.22	6.3
Ashland	64	6	36.2	3.84	4.8
Barboursville	70	3	36.7[f]	3.76	9.0
Bedford City	65	7	38.2	3.96	8.5
Bigstone Gap	63	7	36.6	4.42	7.5
Birdsnest *[1]	66	14	39.9	3.75	8.0
Blacksburg	74	5	33.6	3.75	12.0
Buckingham	64	− 7	33.4	4.53	11.5
Burkes Garden	56	0	33.1	2.47	8.2
Callaville	67	9	36.8	2.80	6.5
Charlottesville	60	8	37.1	4.47	8.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Christiansburg	.....	.....	.....	4.07	12.5
Clarksville	.....	.....	.....	3.95	17.0
Clifton Forge	54	0	31.2	1.49	T.
Colemans Falls	70	6	39.0	4.91	6.3
Dale Enterprise	62	−11	31.0	1.87	4.0
Doswell	70	3	32.4	4.26	4.0
Dwale	.....	.....	.....	3.96	7.2
Farmville	63	7	36.2	3.55	6.0
Fredericksburg	60	5	35.0	4.61	7.0
Grahams Forge	59	8	33.4	2.62	7.9
Hampton	62	17	40.0	2.84	6.0
Hot Springs	56	.....	.....	1.72	5.0
Leesburg	.....	.....	.....	1.34	2.2
Lexington	64	0	34.4	3.79	8.4
Manassas	60	− 2	33.3	3.26	4.0
Marion	65[c]	9[c]	35.2[c]	3.10	8.0
Miller School	66	3	36.2	3.64	1.5
Monterey	54	− 4	28.0	2.00	10.0
Newport News	67	15	41.8	2.05	3.0
Petersburg	66	6	38.9	2.94	13.6
Quantico	56	0	31.0	.....	.....
Radford	.....	.....	.....	5.04	8.0
Richmond (near)	66	8	37.2	4.23	13.0
Rockymount	63	7	38.0	4.04	7.5
Salem	68	10	39.8	3.37	7.0
Speers Ferry	...	.....	.....	4.02	5.0
Spottsville	70	1	37.6	3.12	7.5
Stanardsville	60	6	34.8	4.11	8.8
Staunton	62	− 4	36.0	3.46	8.0
Stephens City	62[b]	− 5[b]	33.6[b]	1.31	7.0
Sunbeam	75	11	42.0	3.49	4.0
Tobaccoville	63	5	38.5	4.19	9.0
Warrenton	56	10	34.9	5.34	8.5
Warsaw	64	5	35.7	3.02	4.0
Westbrook	62	5	35.5	.....	.....
Westpoint	67	7	33.0	4.07	8.5
Woodstock	60	−12	32.6	2.16	4.0
Wytheville	63	10	35.2	2.35	9.0
Washington.					
Aberdeen	54	22	40.8	17.67	5.8
Anacortes	... ..	.....	.....	4.80	12.0
Ashford	.....	....	.....	11.95	18.5
Blaine	53	2	33.1	6.50	6.0
Brinnon	52	11	38.1	12 19	24.1
Cedar Lake	.....	.....	.....	19.14	17.0
Cedonia	48	−20	23.4	2.91	32.1
Centerville	57	− 1	28.5	3.00	13.5
Clearwater	51	21	40.4	24.28	4.8
Cle Elum	54	− 7	31.0	4.70	36.3
Colfax	55	−18	32.4	3.27	5.9
Coupeville	55	7	39.2	3.33	19.0
Dayton	58	−11	34.8	2.16	.....
Ellensburg	55	−20	28.8	2.44	.....
Ellensburg (near)	54	−12	27.7	2.07	19.5
Fort Simcoe	62	− 8	31.4	3.71	35.0
Fort Spokane	48	−28	23.0	2.90	29.0
Grandmound	53	5	39.4	11.28	22.0
Hooper	59	−19	33.6	1.69	4.4
Kennewick	65	−13	34.5	1.65	12.2
Lacenter	56	20	39.3	9.02	12.2
Lakeside	48	− 7	25.6	2.94	26.5
Lind	58	−16	29.1	1.88	13.3
Loomis [d]	45	−15	22.8	1.29	.....
Madrone	55	8	39.6	7.27	22.0
Mayfield	54	17	39.8	10.70	11.0
Moxee Valley	54	−15	27.9	7.39	72.5
New Whatcom	58	3	39.2	3.87	13.0
Northbend	54	11	35.9	12.18	8.0
Olga	52	15	38.6	4.15	10.0
Olympia	57	12	41.0	12.60	28.5
Orcas Island	52	10	40.0	3.96	18.0
Pinehill	60	9	32.8	6.60	29.2
Pomeroy	56	4	36.0	2.38	7.2
Port Townsend	53	18	40.0	2.77	15.0
Pullman	51	−13	30.9	3.88	10.0
Rosalia	51	−26	28.4	3.27	17.3
Sedro	51	9	37.0	6.44	9.0
Shoalwater Bay *[10]	51	26	43.0	... ...	...
Snohomish	54	3	38.5	7.19	17.0
Snoqualmie	.....	.....	.....	11.34	.....
Southbend	56	24	41.3	19.83	T.
Stampede	48	2	27.6	12.34	64.0
Sunnyside	61	−16	28.4	2.08	20.0
Tunnel	48	6	33.8	13.80	81.0
Union City	52	12	38.6	15.65	26.8
Usk	44	−36	22.8	4.23	37.0
Vancouver	60	15	40.0	6.46	12.4
Vashon	54	14	40.2	8.31	22.0
Waterville	66	−18	24.8	2.77	27.0
Wilbur	41	−18	24.0	3.87	29.5
West Virginia.					
Beckley	.....	.....	.....	4.31	6.8
Beverly	63	−17	31.0	4.23	11.0
Bluefield	62	− 2	35.2	2.20	9.3
Buckhannon *a*	.....	.....	.....	6.38	9.5
Buckhannon *b*	65	−16	31.8	.....	.....
Burlington	61	−18	29.8	3.25	9.0
Charleston	....	....	....	7.01	6.0
Dayton	69	−20	33.4	5.51	8.8
Eastbank	62	1	31.5	6.35	3.0
Elkhorn	66	6	36.2	3.01	6.7
Fairmont	.....	.....	.....	4.44	12.6
Glenville	66	−11	32.4	6.04	8.7
Grafton	68	−21	34.0	4.87	10.0
Green Sulphur	63	0	34.0	2.53	6.0
Harpers Ferry	.....	.....	.....	3.25	8.7
Hinton *a*	....	.....	....	2.96	8.0
Hinton *b*	60	2	34.4	.....	5.0
Huntington	67	− 5	32.2	5.77	4.0
Kingwood	65	− 8	30.3	5.37	.....
Marlinton	55	−11	29.6	3.36	4.0
Martinsburg	56	5	30.9	2.05	4.0
Morgantown	68	− 8	30.6	4.37	9.3
New Cumberland	64	0	30.4	2.33	.....
New Martinsville	65	− 5	33.0	3.88	11.0
Oldfields	62	−20	29.8	2.91	3.5
Parsons	63	−11	32.4	4.25	3.0
Philippi *a*	.....	−11	.....	5.29	13.0
Point Pleasant	66	− 5	33.3	5.29	10.0
Powellton	67	1	34.2	5.10	5.0
Romney	56	−12	31.2	2.12	6.5
Rowlesburg	.....	.....	.....	3.94	19.0
Upper Tract	60	−14	33.2	2.28	10.5
Weston *a*	....	.....	.....	5.33	.....
Weston *b*	66	−10	35.1	.....	10.0
Wheeling *a*	....	.....	.....	3.50	14.2
Wheeling *b*	64	− 1	32.9	2.81	10.0
Wisconsin.					
Amherst	42	−31	9.4	1.30	13.0
Antigo	40	−36	9.8	0.60	6.0
Barron	38	−40	7.4	0.45	4.5
Bayfield	40	−30	11.2	1.55	15.5
Beloit	47	−17	19.9	0.22	3.0
Brodhead	46	−20	19.5	0.15	T.
Butternut	47	−42	8.6	1.50	15.0
Chilton	40[h]	−25[h]	10.1[h]	0.90	9.0
Citypoint	45	−29	13.5	1.05	10.5
Delavan [e]	44	− 8	22.8	0.37	2.2
Dodgeville	44	−25	16.2	0.99	5.3
Easton	41	−40	18.2	1.02	9.6
Eau Claire	41	−33	10.6	0.98	9.5
Florence	42	−28	9.8	1.35	13.5
Fond du Lac	40	−22	16.0	0.60	4.0
Grand River Locks	.....	.....	.....	1.28	12.0
Grantsburg	.....	−42	.....	0.77	7.8
Gratiot	46	−22	15.8	0.60	4.0
Hartford	42	−22	17.8	0.73	6.0
Harvey	42	−17	17.8	0.56	4.3
Hayward	41	−43	9.4	1.15	11.6
Heafford Junction	41	−34	10.6	0.64	6.0
Hillsboro	43	−33	15.6	0.92	8.0
Knapp	43	−39	10.8	0.65	6.5
Koepenick *[1]	40	−24	8.7	1.30	13.0
Lancaster	42	−22	15.7	0.37	3.5
Lincoln	.....	.....	.....	1.31	11.0
Madison	40	−30	16.8	0.39	4.0
Manitowoc	40	−22	16.8	0.83	5.8
Meadow Valley	46	−34	11.2	0.95	9.5
Medford	41	−37	8.0	0.80	8.0
Menasha	.....	.....	.....	1.07	9.8
Neillsville	41	−40	10.5	0.95	8.5
New Holstein	42	−22	12.8	0.70	7.0
New London	39	−31	12.4	1.04	8.5
Oconto	41	−27	13.0	1.45	11.5
Osceola	38	−46	6.9	0.90	9.1
Oshkosh	40	−26	17.2	0.75	7.0
Pepin	43	−32	11.7	0.94	8.0
Pine River	40	−30	14.2	1.00	9.0
Portage	40	−21	15.8	0.70	6.0
Port Washington	50	−22	21.2	0.40	3.0
Prairie du Chien	52	−20	22.4	0.71	5.5
Prentice *[1]	38	−31	8.1	0.81	8.1
Racine	46	−15	21.8	0.35	.....
Sharon	43	−20	17.8	0.28	1.0
Shawano	41	−31	12.1	1.70	15.0
Spooner	45	−40	7.4	1.50	15.0
Stevens Point	45	−37	10.0	0.90	9.0
Sturgeon Bay Canal *[9]	38	−26	15.5	.....	.....
Valley Junction	42	−32	13.2	0.97	9.8
Viroqua	39	−24	15.4	0.57	4.8
Watertown	42	−19	16.8	1.21	7.8
Waukesha	43	−19	17.8	0.64	5.0
Waupaca	39	−38	11.8	1.57	14.5
Wausau	41	−34	10.6	1.51	14.5
Wausaukee	42	−28	12.5	0.75	7.5
West Bend [d]	43	−20	17.4	T.	T.
Westfield	39	−30	14.4	0.84	6.4
Whitehall	41	−38	11.6	0.80	5.0
Wyoming.					
Alcova	49	−12	25.8	0.70	7.0
Basin	50	−20	18.0	1.84	18.4
Big Piney	37	−20	19.8	0.45	4.5
Binford [1]	.....	.....	24.0	2.26	22.6
Bitter Creek	49	2	26.0	0.60	6.0
Carbon	47	1	22.9	.....	.....
Dome Lake	35	−14	16.3	.....	.....
Evanston	38	− 7	19.6	1.48	14.8
Fort Laramie	53	−20	26.4	0.85	14.5
Fort Washakie	56	−13	20.8	0.51	5.1
Fort Yellowstone	40	−11	20.4	4.21	42.1
Four Bear	52	−18	23.8	0.51	7.8
Hecla	60	− 2	27.4	0.96	14.1
Laramie	46	− 3	20.6	0.95	9.5
Lusk	52	−20	22.0	1.30	13.0
Rawlins	39	− 7	23.0	1.16	11.6
Sheridan	48	−21	18.0	3.02	20.2
Sherman	.....	.....	.....	6.40	64.0
Sundance [j]	60	−16	24.2	.....	.....
Thayne	44	− 7	27.2	2.88	28.8
Wamsutter	.....	.....	.....	0.10	1.0
Wheatland	54	−14	28.2	0.60	6.0
Mexico.					
Ciudad P. Diaz	76	24	50.6	0.00	
Coatzacoalcos [2]	....	.....	72.0	.....	
Leon de Aldamas	73	32	55.3	0.06	
Puebla	72	31	52.0	0.55	
Tampico [2]	.....	.....	64.0	.....	
Topolobampo *[1]	77	50	62.0	.....	
Vera Cruz [2]	.....	.....	67.8	.....	
Porto Rico.					
Cayey	80	53	68.4	.....	
Fajardo	87	65	76.9	4.53	
Luquillo	81	65	72.9	4.74	
Mayaguez [e]	86	61	73.8	.....	
Ponce *[1]	89	64	75.9	.....	
Puenta de Tierra	84	66	74.7	.....	
Vieques	.....	.....	.....	2.16	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. + 4.
[2] Mean of 8 a. m. + 8 p. m. + 2.
[3] Mean of 7 a. m. + 7 p. m. + 2.
[4] Mean of 6 a. m. + 6 p. m. + 2.
[5] Mean of 7 a. m. + 2 p. m. + 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

January, 1898, St. Paul, Nebr., make precipitation 0.56. Freehold, N. J., make precipitation 3.32. Westpoint, N. Y., make precipitation 4.80. Forks of Neshaminy, Pa., make precipitation 3.88.

February, 1898, Valparaiso, Ind., make precipitation 1.26.

April, 1898, Weeping Water, Nebr., make precipitation 3.61. Bryson City, N. C., make precipitation 5.40.

May, 1898, Blaine, Nev., make precipitation 2.81.

June, 1898, Decatur, Tenn., make precipitation 4.35.

July, 1898, Florence, Tenn., make precipitation 8.66.

August, 1898, Bar Harbor, Me., make precipitation 2.92. Westpoint, N. Y., make precipitation, 9.08. Desmet, S. Dak., make precipitation 0.62.

October, 1898, Clinton, Tenn., make precipitation 4.63.

November, 1898, Groton, Mass., make precipitation 6.20. Lynch, Nebr., make precipitation 0.08.

December, 1898, Cedarville, Cal., make precipitation 1.17.

January, 1899 Review. On page 7, under head of "Atmospheric electricity," second line, make Table IX read Table VIII.

NOTE.—The following changes have been made in names of stations:

Arizona, Sulphur Spring Valley changed to Allaire Ranch.

California, Saticoy changed to West Saticoy.

Colorado, Millbrook changed to Westcliffe.

Washington, Hunters changed to Cedonia.

TABLE III.—*Mean temperature for each hour of seventy-fifth meridian time, January, 1899.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	5.5	5.5	5.1	5.1	5.1	5.0	4.9	4.7	4.0	4.1	5.6	8.9	11.5	14.2	15.6	16.7	16.6	15.7	12.9	11.5	9.5	7.9	7.1	6.2	8.7
Boston, Mass	26.7	26.1	25.4	25.2	24.7	24.6	24.4	25.2	26.3	28.1	29.8	32.1	33.5	34.2	34.4	33.6	32.7	31.5	30.4	29.5	28.8	28.3	27.7	26.9	28.8
Buffalo, N. Y.....	24.3	23.8	23.0	22.8	22.4	21.9	22.0	22.2	22.5	23.3	24.3	25.3	26.5	27.0	27.3	27.2	27.2	26.6	26.1	26.2	25.8	25.5	25.1	24.6	24.7
Chicago, Ill.....	22.1	22.0	21.9	21.8	22.0	22.0	21.7	21.8	21.2	21.3	21.9	23.2	24.4	25.3	26.0	26.2	26.2	25.8	25.2	24.5	23.9	23.4	22.9	22.5	23.3
Cincinnati, Ohio....	30.5	30.1	29.0	28.8	28.5	28.3	28.0	28.7	28.4	29.5	31.2	33.1	34.4	35.3	35.9	36.5	36.5	35.9	35.0	34.3	33.5	32.8	32.2	31.4	32.0
Cleveland, Ohio	24.9	24.2	23.7	23.6	23.2	23.1	23.3	23.7	24.8	26.0	26.9	28.1	29.0	29.5	29.5	29.7	29.3	28.6	28.3	28.0	27.2	26.4	26.0	25.3	26.3
Detroit, Mich.....	22.5	22.0	21.6	21.3	21.2	21.1	21.1	21.5	21.9	23.0	24.0	25.3	25.7	26.9	27.5	27.8	27.1	26.7	25.8	25.4	24.7	24.1	23.4	22.8	23.9
Dodge, Kans.....	26.5	25.6	25.1	25.2	24.2	23.3	22.2	21.8	20.9	22.4	26.2	30.7	34.2	37.6	39.8	41.0	41.2	40.4	36.6	32.4	30.5	29.3	28.1	27.0	29.7
Eastport, Me.....	20.2	20.0	19.9	19.7	19.8	19.3	18.7	18.6	18.8	19.3	20.4	21.5	22.7	23.5	23.9	24.0	23.3	22.7	22.2	22.0	21.6	21.4	20.9	20.8	21.0
Galveston, Tex.....	52.6	52.6	52.5	52.2	51.6	51.2	50.7	50.4	49.9	50.4	51.9	53.6	54.3	54.7	55.1	55.5	55.9	55.4	54.3	53.8	53.4	53.0	53.0	53.0	53.0
Havre, Mont.....	13.9	14.5	14.4	14.4	14.0	14.2	13.8	13.7	13.3	13.3	13.4	14.1	15.9	16.7	17.8	19.1	19.5	19.6	18.1	16.1	14.5	13.8	14.0	13.8	15.2
Kansas City, Mo.....	29.3	29.0	28.5	28.2	27.2	26.7	26.3	25.5	24.4	25.2	27.1	28.9	30.7	32.3	34.2	35.0	35.7	35.2	33.9	33.0	31.8	31.0	30.3	29.6	30.0
Key West, Fla.....	69.0	69.0	68.8	68.7	68.6	68.5	68.6	69.0	70.3	71.3	72.5	73.4	73.4	73.1	73.0	72.9	72.0	70.8	70.2	70.2	69.6	69.5	69.3	68.9	70.4
Marquette, Mich	12.3	13.2	12.0	11.7	11.6	11.5	11.6	11.5	11.4	12.1	13.4	14.6	15.8	16.6	17.3	17.4	17.0	16.1	15.2	14.6	13.6	13.2	12.9	12.6	13.7
Memphis, Tenn.....	38.6	38.1	37.5	37.2	36.7	36.3	36.0	35.7	35.9	36.9	38.7	40.3	41.8	42.9	44.2	45.1	45.2	44.6	43.4	42.8	41.2	40.5	39.5	38.9	39.9
Mt. Tamalpais, Cal..	47.2	47.3	46.8	46.6	46.6	46.6	46.4	46.5	46.5	46.2	46.5	47.1	48.1	48.6	49 1	49.4	49.1	49.1	48.7	47.8	47.7	47.8	47.7	47.4	47.5
New Orleans, La.....	51.2	50.7	50.4	50.1	49.6	49.4	49.2	48.8	48.5	49.2	51.3	53.7	55.2	56.5	57.5	57.8	58.0	57.0	55.9	54.5	53.6	52.9	52.3	51.7	52.7
New York, N. Y.....	29.3	28.6	28.1	27.5	27.1	27.2	27.3	27.9	28.2	29.3	30.5	31.9	33.5	34.5	35.0	34.4	34.0	33.3	32.7	32.5	31.5	31.1	30.8	29.7	30.7
Philadelphia, Pa.....	30.7	30.2	29.4	28.8	28.4	28.4	28.1	28.5	29.2	31.0	32.4	34.1	35.0	35.7	36.4	36.4	35.7	34.9	34.0	33.9	33.2	32.5	31.7	31.1	32.1
Pittsburg, Pa.....	29.6	29.3	28.9	28.5	28.0	27.7	27.3	27.5	27.9	29.4	31.1	32.7	34.1	34.6	35.6	35.6	35.0	34.4	33.1	32.8	31.9	31.4	30.8	30.0	31.2
Portland, Oreg.....	40.2	40.4	40.3	39.8	39.5	39.5	39.8	39.5	39.2	39.0	38.9	38.7	39.4	39.9	40.4	41.6	42.4	42.9	43.0	42.5	42.3	41.7	41.1	40.4	40.5
St. Louis, Mo.....	30.9	30.5	30.0	29.7	29.1	28.9	28.9	28.8	28.6	29.0	30.7	32.6	34.7	36.5	37.5	37.4	36.9	35.7	34.6	33.7	33.0	32.5	31.9	31.3	32.2
St. Paul, Minn.....	13.0	12.1	11.2	10.5	9.8	9.2	8.6	7.7	7.3	7.2	8.2	10.0	12.5	14.3	16.1	17.6	18.7	18.8	17.8	16.9	16.5	16.1	15.2	14.2	12.9
Salt Lake City, Utah.	32.4	31.7	31.6	31.2	30.7	30.6	30.8	31.4	30.6	30.6	31.2	32.6	34.4	35.7	36.5	37.7	38.0	37.8	36.7	35.6	34.6	33.2	32.7	32.9	33.4
San Diego, Cal.....	53.0	52.5	52.0	51.7	51.7	51.3	51.0	50.5	50.3	49.7	50.7	53.8	57.0	58.7	59.9	60.8	60.9	60.7	59.9	58.7	57.1	56.2	54.8	53.8	54.9
San Francisco, Cal...	52.4	52.4	51.9	51.8	51.1	50.7	50.3	50.1	49.7	49.0	48.9	49.6	50.5	52.0	53.5	54.9	56.2	56.8	56.7	56.0	55.4	54.5	53.9	53.1	52.6
Santa Fe, N. Mex ...	22.8	21.9	21.9	21.4	20.6	20.2	19.4	19.5	18.5	20.2	24.3	27.5	29.4	31.8	33.5	34.4	35.0	34.8	32.1	29.6	26.4	25.8	25.3	24.2	25.9
Savannah, Ga.....	47.6	47.2	46.6	46.0	45.6	45.3	45.1	45.1	46.3	48.7	51.6	53.8	54.9	55.9	56.4	56.1	55.2	53.4	51.5	50.7	49.7	49.0	48.4	47.7	49 9
Washington, D. C....	31.0	30.6	30.0	29.3	28.7	28.4	28.1	28.0	29.4	31.3	33.6	35.4	36.7	38.2	39.0	39.2	38.9	37.5	35.9	34.7	34.0	33.2	32.8	31.9	33.2
West Indies.																									
Basseterre, St. Kitts.	73.9	74.0	73.7	73.9	74.0	74.5	74.9	75.9	76.9	78.2	79.1	79.6	79.4	79.0	78.3	77.6	76.5	75.6	75.4	75.2	74.9	74.7	74.3	74.1	76.0
Bridgetown, Bar.....	73.1	72.9	72.8	72.7	73.0	73.6	76.4	77.7	79.5	80.4	80.9	80.9	81.2	80.6	79.7	78.4	76.5	75.2	74.6	74.3	73.9	73.8	73.5	73.2	76.2
Colon, U. S. C.....	76.9	76.6	76.4	76.4	76.1	76.1	75.6	76.7	78.6	79.7	80.8	81.9	81.9	81.5	81.3	81.1	80.0	79.1	78.5	78.2	77.6	77.5	77.2	77.1	78.4
Kingston, Jamaica ..	70.0	69.7	69.7	69.3	69.4	69.1	68.6	70.9	76.1	80.1	81.6	82.8	82.9	82.1	81.6	80.9	79.2	76.7	74.7	73.3	72.3	71.5	70.6	70.1	74.7
Port of Spain, Trin..	72.0	71.4	71.5	71.3	71.7	72.5	75.4	78.0	80.6	82.3	82.3	82.6	82.5	81.7	80.9	79.1	77.7	75.6	74.9	74.6	73.9	73.5	73.0	72.6	76.3
Roseau, Dominica...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan, P. R.....	71.6	71.5	71.0	71.0	70.6	70.8	72.3	74.0	75.7	77.7	78.3	78.9	78.6	78.8	78.2	77.2	75.8	75.2	74.4	73.8	73.3	72.7	71.2	71.5	74.4
Santiago de Cuba...	70.8	70.2	69.8	69.2	69.0	69.0	68.8	72.1	76.7	80.9	83.7	84.7	84.9	84.8	83.6	82.0	80.4	77.9	76.5	75.1	74.1	72.9	72.3	71.3	75.9
Santo Domingo, S. D.	67.9	67.8	67.0	66.9	66.9	66.7	67.6	71.9	75.7	78.4	79.6	80.4	80.5	79.5	78.6	77.8	76.9	75.1	73.3	71.7	70.3	69.4	68.8	68.4	72.8
Willemstad, Curaçao	75.5	75.1	74.9	74.9	74.8	75.1	76.0	77.3	78.7	80.1	80.5	80.5	80.7	80.8	79.7	79.0	78.3	77.2	76.8	76.5	76.0	76.0	75.9	75.4	77.3

TABLE IV.—*Mean pressure for each hour of seventy-fifth meridian time, January, 1899.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	28.175	.175	.174	.175	.174	.163	.160	.161	.158	.153	.157	.160	.155	.138	.134	.122	.127	.140	.148	.155	.157	.157	.160	.166	.156
Boston, Mass.....	29.938	.946	.942	.941	.943	.955	.971	.984	.992	.997	.978	.962	.949	.950	.954	.956	.962	.966	.965	.958	.953	.949	.939	.930	.958
Buffalo, N. Y.....	29.225	.236	.245	.243	.240	.243	.253	.251	.258	.257	.251	.224	.199	.189	.194	.196	.200	.208	.215	.212	.213	.215	.218	.215	.225
Chicago, Ill.....	29.188	.182	.187	.184	.175	.173	.178	.187	.195	.202	.206	.195	.173	.158	.154	.160	.166	.174	.180	.185	.187	.185	.186	.181	.181
Cincinnati, Ohio	29.463	.465	.471	.471	.462	.456	.464	.472	.484	.495	.499	.480	.460	.440	.438	.440	.443	.453	.458	.462	.462	.462	.463	.457	.463
Cleveland, Ohio	29.273	.283	.288	.279	.273	.273	.275	.273	.278	.281	.275	.258	.237	.233	.240	.244	.248	.251	.255	.255	.259	.261	.265	.263	.263
Detroit, Mich.....	29.311	.315	.319	.312	.302	.297	.295	.299	.300	.304	.305	.295	.277	.265	.265	.269	.272	.279	.285	.289	.288	.290	.296	.308	.293
Dodge, Kans	27.421	.416	.415	.422	.420	.414	.412	.407	.421	.429	.437	.437	.419	.390	.365	.356	.356	.357	.364	.381	.388	.391	.394	.396	.400
Galveston, Tex.....	30.064	.062	.062	.057	.054	.054	.060	.063	.080	.097	.104	.094	.068	.045	.025	.016	.013	.015	.022	.034	.044	.047	.048	.048	.053
Havre, Mont.....	27.262	.258	.259	.260	.266	.265	.258	.258	.261	.264	.273	.284	.289	.278	.265	.260	.262	.265	.263	.260	.263	.262	.262	.265	.265
Kansas City, Mo.....	29.072	.071	.071	.073	.071	.066	.069	.074	.084	.094	.102	.106	.094	.070	.052	.045	.043	.043	.042	.044	.049	.050	.049	.050	.066
Key West, Fla.....	30.078	.072	.066	.063	.060	.065	.071	.085	.106	.115	.111	.093	.075	.056	.042	.040	.047	.052	.056	.072	.075	.076	.079	.079	.072
Marquette, Mich	29.143	.148	.154	.149	.140	.132	.135	.144	.150	.158	.159	.155	.137	.121	.119	.124	.126	.132	.135	.140	.137	.136	.135	.131	.139
Memphis, Tenn.....	29.730	.727	.735	.737	.735	.732	.736	.744	.757	.772	.781	.775	.743	.721	.707	.703	.705	.705	.707	.713	.712	.718	.720	.719	.731
Mt. Tamalpais, Cal .	27.647	.649	.644	.645	.650	.646	.635	.627	.628	.632	.641	.649	.659	.653	.625	.613	.610	.615	.618	.618	.624	.627	.631	.633	.634
New Orleans, La.....	30.085	.083	.084	.083	.078	.075	.081	.095	.105	.120	.126	.113	.090	.059	.051	.049	.052	.057	.063	.066	.074	.076	.080	.078	.080
New York, N. Y.....	29.785	.794	.798	.797	.798	.809	.824	.835	.842	.844	.833	.811	.788	.783	.782	.782	.783	.786	.788	.787	.786	.784	.781	.778	.799
Philadelphia, Pa.....	30.034	.046	.056	.052	.053	.061	.072	.085	.093	.096	.090	.063	.038	.030	.025	.024	.029	.031	.028	.025	.024	.026	.027	.028	.047
Pittsburg, Pa.....	29.220	.222	.229	.223	.216	.219	.229	.230	.240	.244	.240	.220	.197	.188	.187	.189	.195	.201	.209	.212	.218	.217	.220	.217	.216
Portland, Oreg.....	29.921	.925	.925	.923	.926	.932	.925	.917	.910	.910	.913	.921	.930	.930	.930	.908	.900	.904	.907	.901	.901	.907	.909	.914	.916
St. Louis, Mo.....	29.516	.512	.519	.522	.514	.510	.515	.523	.535	.547	.555	.547	.527	.508	.488	.492	.495	.498	.502	.506	.504	.503	.503	.502	.514
St. Paul, Minn.....	29.092	.094	.098	.110	.106	.103	.101	.103	.111	.119	.125	.125	.108	.085	.071	.071	.071	.073	.069	.068	.066	.065	.065	.069	.090
Salt Lake City, Utah.	25.698	.700	.699	.701	.709	.705	.693	.694	.701	.706	.715	.724	.726	.708	.688	.679	.677	.678	.677	.677	.677	.678	.674	.675	.694
San Diego, Cal.....	30.001	.002	.001	.998	.999	.997	.983	.978	.983	.996	.011	.025	.027	.018	.982	.963	.954	.954	.956	.958	.965	.971	.979	.985	.987
San Francisco, Cal...	30.005	.007	.006	.009	.015	.010	.000	.997	.999	.004	.012	.021	.025	.009	.983	.969	.965	.966	.965	.964	.973	.979	.984	.990	.994
Santa Fe, N. Mex ...	33.206	.204	.200	.200	.199	.193	.187	.186	.189	.196	.204	.211	.208	.191	.171	.164	.162	.164	.169	.176	.181	.184	.187	.190	.188
Savannah, Ga.....	30.084	.089	.093	.092	.091	.095	.106	.117	.125	.131	.123	.105	.078	.059	.052	.054	.055	.061	.071	.077	.077	.082	.085	.085	.087
Washington, D. C....	30.059	.069	.072	.069	.068	.076	.083	.092	.107	.111	.104	.075	.048	.037	.033	.034	.031	.035	.037	.037	.042	.045	.048	.050	.061
West Indies.																									
Basseterre, St. Kitts.	29.984	.971	.968	.972	.982	.998	.015	.037	.076	.036	.019	.995	.979	.969	.966	.971	.979	.988	.997	.007	.009	.008	.007	.994	.996
Bridgetown, Bar.....	29.915	.907	.910	.912	.921	.938	.958	.972	.974	.967	.951	.930	.911	.903	.907	.913	.919	.926	.936	.943	.945	.943	.938	.928	.932
Colon, U. S. C.....	29.820	.809	.798	.797	.802	.808	.831	.848	.861	.864	.855	.839	.813	.794	.774	.770	.777	.788	.796	.810	.826	.833	.836	.833	.816
Kingston, Jamaica ..	29.982	.670	.661	.657	.660	.666	.687	.710	.723	.725	.709	.688	.654	.633	.624	.626	.637	.650	.663	.680	.692	.695	.696	.691	.674
Port of Spain, Trin..	29.862	.854	.852	.858	.870	.889	.917	.929	.929	.917	.896	.874	.852	.840	.836	.841	.847	.855	.868	.877	.883	.884	.880	.875	.874
Roseau, Dominica ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan, P. R.....	29.952	.941	.935	.937	.947	.961	.976	.990	.990	.995	.980	.959	.938	.923	.923	.928	.937	.941	.953	.965	.968	.969	.964	.958	.956
Santiago de Cuba...	29.908	.895	.886	.886	.892	.901	.917	.935	.953	.948	.928	.898	.874	.857	.853	.858	.867	.880	.890	.902	.913	.917	.916	.912	.899
Santo Domingo, S. D.	29.989	.976	.970	.969	.977	.990	.010	.029	.042	.039	.017	.987	.965	.946	.941	.945	.953	.963	.976	.991	.001	.004	.002	.997	.987
Willemstad, Curaçao	29.838	.838	.823	.825	.836	.851	.875	.891	.898	.892	.872	.853	.828	.810	.804	.806	.812	.819	.834	.848	.860	.863	.862	.856	.845

TABLE V.—*Average wind movement for each hour of seventy-fifth meridian time, January*, 1899.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	10.9	10.3	10.0	10.2	10.3	9.5	9.3	9.7	9.4	9.5	10.6	12.6	14.2	14.0	13.5	13.1	13.0	12.0	11.6	9.5	9.0	9.6	10.0	10.0	10.9
Albany, N. Y	7.9	7.9	7.8	8.1	7.9	8.0	9.0	9.0	8.8	9.1	10.0	9.8	10.2	11.0	11.4	10.7	9.5	9.9	9.4	8.8	8.7	8.1	8.2	7.8	9.0
Alpena, Mich	9.9	9.2	9.8	9.6	9.2	9.3	9.4	9.2	9.5	10.5	11.8	12.3	13.0	13.3	13.2	12.3	11.8	10.1	10.4	10.9	10.9	11.5	10.5	9.9	10.7
Amarillo, Tex	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlanta, Ga	10.1	10.4	10.5	10.4	10.2	9.8	8.7	9.2	9.5	9.6	10.0	10.1	10.7	10.4	10.6	10.6	10.3	9.5	8.3	9.6	9.2	9.6	9.9	10.1	9.9
Atlantic City, N. J	11.8	12.5	12.4	12.4	12.8	13.0	12.9	12.8	13.3	14.1	14.3	13.9	13.9	14.0	14.0	13.6	12.2	10.5	10.6	10.6	10.5	10.9	11.4	11.5	12.5
Augusta, Ga	5.6	5.4	5.2	5.8	5.9	5.8	6.1	5.7	5.9	6.3	7.1	7.6	8.7	9.1	8.8	8.5	8.2	7.2	5.8	5.4	5.3	5.2	5.6	5.6	6.5
Baker City, Oreg	4.9	5.6	6.2	6.0	5.5	5.5	5.3	5.7	5.6	6.0	5.7	6.2	5.6	5.3	4.8	4.7	5.0	4.5	4.3	4.4	4.8	5.2	5.1	5.2	5.3
Baltimore, Md	5.2	5.2	5.3	5.0	5.0	5.0	4.9	5.0	5.6	5.9	5.9	5.9	6.2	5.9	5.9	5.6	4.8	4.7	4.2	4.0	4.2	4.7	4.8	4.7	5.2
Bismarck, N. Dak	8.2	7.9	7.8	8.4	7.5	7.4	7.7	7.3	8.2	8.1	8.8	10.7	12.5	13.8	15.5	15.6	15.8	13.9	12.4	10.1	10.7	11.0	10.3	9.3	10.4
Block Island, R. I	15.5	15.6	14.9	15.3	15.0	15.2	15.8	16.1	16.5	16.9	16.1	16.4	16.8	17.5	17.9	17.2	16.2	15.8	14.9	14.5	14.5	15.2	14.5	16.1	15.9
Boise, Idaho	5.5	5.2	4.8	5.0	5.1	5.0	4.5	4.2	4.3	4.5	4.6	4.4	4.8	6.0	6.5	6.9	7.0	6.4	5.8	4.8	4.7	4.8	4.5	4.6	5.2
Boston, Mass	12.2	12.0	11.8	11.5	11.4	12.0	12.6	13.2	13.8	13.5	14.1	14.4	14.9	14.9	14.7	14.3	13.2	13.2	13.3	12.7	12.9	12.7	12.0	11.5	13.0
Buffalo, N. Y	20.7	19.5	20.1	20.4	20.9	20.4	19.4	19.0	18.9	18.9	20.5	20.6	21.4	21.1	22.0	20.5	20.2	20.2	20.5	20.5	20.1	20.0	20.7	20.8	20.0
Cairo, Ill	10.3	10.7	10.6	10.5	10.5	10.0	9.7	10.2	10.2	10.3	11.9	12.2	12.4	12.0	11.5	11.3	11.2	10.3	9.4	9.2	9.8	10.8	11.3	10.8	10.7
Cape Henry, Va	13.2	13.0	13.2	13.1	12.6	14.0	14.8	15.0	15.4	15.3	14.3	14.0	14.2	15.0	15.2	14.6	13.5	13.2	13.7	13.9	14.6	14.3	14.3	14.1	14.1
Carson City, Nev	7.5	6.2	4.9	4.7	5.4	5.6	5.5	5.2	5.7	5.2	5.2	4.6	4.8	5.2	5.6	5.9	6.7	7.1	8.7	8.0	7.7	7.5	6.7	6.8	6.1
Charleston, S. C	11.2	11.1	11.3	11.7	11.2	11.2	11.6	12.0	12.0	12.4	12.1	12.1	12.3	12.2	12.3	11.6	11.2	10.4	9.8	10.4	10.0	9.8	10.5	10.8	11.3
Charlotte, N. C	7.6	7.6	7.2	7.1	7.3	6.8	7.0	6.8	7.1	7.5	8.2	8.5	9.2	9.5	9.1	9.4	8.5	6.9	6.8	7.0	7.4	7.6	7.6	7.2	7.7
Chattanooga, Tenn	7.4	7.1	7.2	6.8	6.6	6.2	5.9	5.8	6.2	7.4	7.9	8.6	8.9	9.0	9.9	9.9	9.2	8.4	7.5	7.4	7.2	7.5	7.4	6.8	7.6
Cheyenne, Wyo	13.3	13.0	12.6	12.9	13.8	12.8	14.3	14.0	14.7	14.7	17.1	18.2	20.8	21.2	20.1	20.9	20.1	17.6	16.5	14.2	13.8	13.2	13.2	14.4	15.7
Chicago, Ill	19.2	19.9	19.8	19.3	18.7	18.5	17.9	17.7	18.8	18.8	19.4	20.8	21.0	20.8	21.2	20.8	20.3	19.6	19.4	19.9	19.7	19.7	19.6	18.7	19.6
Cincinnati, Ohio	8.9	8.5	8.9	8.2	7.5	7.8	7.9	8.5	8.8	8.7	9.6	9.8	10.2	10.3	10.2	10.0	9.8	9.2	8.8	8.5	8.7	8.1	8.3	8.8	8.9
Cleveland, Ohio	18.4	18.8	18.6	18.0	18.3	18.0	17.3	17.5	17.5	17.8	17.6	17.3	17.3	18.3	18.6	17.2	16.9	17.0	17.1	17.1	17.5	17.7	18.1	18.2	17.8
Columbia, Mo	8.1	8.7	8.2	8.1	8.0	7.8	8.2	8.0	7.5	8.7	9.8	10.2	10.7	11.3	11.5	11.8	11.5	10.2	9.4	8.7	9.0	8.8	9.0	8.6	9.2
Columbus, Ohio	9.3	9.2	8.9	9.0	9.0	8.6	8.5	9.3	8.9	9.3	9.7	9.7	10.5	10.7	10.8	10.2	10.1	9.6	9.5	9.3	9.0	8.8	9.0	9.3	9.4
Concordia, Kans	8.0	8.1	8.0	7.7	7.8	7.8	8.0	7.9	7.7	8.9	9.3	9.6	9.8	10.0	9.7	9.4	9.0	7.5	6.4	6.6	6.8	6.5	7.3	7.9	8.2
Corpus Christi, Tex	8.8	8.5	8.6	9.7	9.4	9.4	9.4	9.6	9.4	9.6	10.3	10.6	10.5	10.6	10.8	10.9	10.8	10.7	10.8	10.5	9.7	9.3	8.9	8.7	9.8
Davenport, Iowa	7.4	7.3	7.1	7.0	7.0	7.4	7.4	7.4	7.5	8.8	9.7	10.1	10.8	11.4	11.0	10.7	10.5	9.1	8.3	7.6	7.6	7.5	7.5	7.5	8.5
Denver, Colo	9.5	9.8	9.4	8.9	8.6	8.4	8.9	8.3	8.6	8.3	9.0	9.7	9.6	9.0	9.8	10.7	9.7	9.0	9.0	9.2	8.2	8.6	8.0	8.9	9.0
Des Moines, Iowa	7.9	7.3	7.4	6.9	7.4	7.5	7.0	7.6	7.8	8.4	9.1	10.1	10.6	11.4	12.0	12.4	11.5	9.8	8.3	7.7	7.8	7.9	8.4	8.1	8.8
Detroit, Mich	13.0	12.4	11.6	11.7	12.0	11.8	11.8	12.4	12.6	14.0	14.1	14.0	14.0	13.9	13.8	14.5	14.1	13.3	12.0	12.6	13.6	13.8	13.9	13.5	13.1
Dodge, Kans	9.1	9.5	9.8	10.8	10.0	9.5	9.4	9.6	9.1	9.6	11.0	11.9	12.7	13.3	14.1	14.3	13.9	12.6	9.9	9.5	9.8	10.2	10.0	10.0	10.8
Dubuque, Iowa	7.0	7.0	7.1	6.8	6.3	6.0	6.4	6.8	7.3	7.5	8.5	9.7	10.5	10.8	11.1	11.3	10.3	8.9	7.8	7.8	8.1	7.8	7.7	7.7	8.2
Duluth, Minn	9.2	8.5	9.2	9.1	9.8	10.8	11.0	11.6	11.5	11.5	11.9	11.9	11.5	11.5	11.3	10.8	10.5	10.3	9.6	9.5	8.8	8.9	8.9	8.5	10.2
Eastport, Me	14.6	13.9	14.2	13.8	14.6	14.1	13.4	13.2	13.0	13.6	13.5	13.8	13.8	14.5	14.2	14.3	14.4	15.3	15.7	14.7	15.0	16.0	15.8	15.4	14.4
El Paso, Tex	9.6	9.2	8.6	8.6	8.3	8.5	9.5	9.1	9.0	9.7	9.0	10.1	11.6	10.5	11.6	13.6	14.0	15.0	13.7	11.8	10.6	10.4	9.8	9.8	10.5
Erie, Pa	14.7	14.5	14.9	15.1	15.0	14.6	14.3	13.9	14.0	15.3	15.5	15.2	14.4	14.6	14.6	13.9	13.5	12.9	13.1	14.4	15.0	15.0	14.6	14.4	14.5
Escanaba, Mich	8.2	8.4	7.6	7.9	7.4	7.4	7.6	7.7	7.7	7.8	8.6	8.8	10.1	10.2	11.0	10.7	10.8	10.5	9.5	9.5	9.3	9.0	8.6	8.2	8.9
Eureka, Cal	6.2	5.6	5.2	4.7	5.3	5.1	4.7	4.7	5.2	4.8	4.3	4.9	5.8	5.5	5.5	7.2	18.3	8.1	7.3	7.7	6.2	6.6	5.4	5.5	5.8
Evansville, Ind	9.3	9.2	8.3	8.9	8.5	8.8	8.7	8.5	8.5	9.4	10.0	10.1	10.5	10.3	10.5	10.2	10.2	9.7	8.6	8.2	8.5	8.7	8.9	9.4	9.2
Fort Canby, Wash	17.6	17.6	17.4	17.0	18.5	18.6	17.5	17.4	16.8	17.6	16.3	18.3	18.7	20.0	20.0	19.6	19.6	19.8	18.7	18.2	17.6	16.9	17.0	17.1	18.1
Fort Smith, Ark	6.7	6.7	6.5	7.1	7.0	7.3	6.9	7.2	7.3	8.3	8.2	7.6	7.6	7.6	8.7	8.8	8.7	8.2	6.9	7.1	6.6	6.6	6.4	6.8	7.4
Fresno, Cal	3.2	3.4	3.4	3.6	3.6	3.5	3.4	3.6	3.6	3.5	3.6	3.6	3.9	3.9	4.0	4.4	4.7	4.2	4.1	3.3	2.9	3.0	3.1	3.2	3.6
Galveston, Tex	9.3	9.1	9.1	9.3	9.7	9.8	10.0	10.4	10.4	11.0	10.9	11.3	10.7	10.8	10.5	10.4	10.6	10.7	10.3	10.3	10.3	9.6	9.4	9.2	10.1
Grand Haven, Mich	13.3	12.5	13.4	13.4	13.5	13.8	14.2	14.2	14.1	14.1	14.4	14.8	14.9	14.5	14.0	14.7	14.6	13.8	14.0	14.4	14.4	14.7	14.3	13.7	14.1
Grand Junction, Colo	3.9	3.5	3.3	2.9	2.6	3.0	2.9	2.9	3.0	2.9	2.7	3.2	3.9	4.3	4.5	4.0	4.2	4.1	3.6	2.5	2.8	3.6	4.0	4.0	3.4
Green Bay, Wis	8.1	7.8	7.8	7.7	8.1	8.8	8.8	8.7	8.8	9.4	9.4	10.2	10.7	11.3	11.6	11.5	11.0	9.3	8.4	8.5	8.3	8.1	8.1	8.1	9.1
Hannibal, Mo	9.9	9.3	9.7	10.0	9.6	10.1	10.1	9.1	9.6	10.7	11.7	12.3	12.5	12.6	12.5	13.0	12.4	10.9	9.8	9.6	9.5	9.4	9.5	9.7	10.6
Harrisburg, Pa	7.1	7.1	6.9	8.1	7.7	7.5	7.6	7.5	7.7	8.1	8.1	8.4	8.9	8.6	8.4	8.0	7.3	6.0	5.8	6.2	6.2	7.0	6.7	7.2	7.4
Hatteras, N. C	15.2	14.9	14.4	15.5	15.9	15.7	14.7	15.8	15.5	16.1	15.7	15.2	15.2	15.0	14.8	14.9	15.5	13.5	15.5	16.2	15.5	16.4	15.7	17.1	15.5
Havre, Mont	14.3	14.3	14.2	13.6	13.7	13.3	13.5	14.2	13.6	13.5	13.6	13.2	14.2	16.5	15.4	14.5	13.8	12.8	13.0	14.2	14.5	14.3	15.1	14.1	14.1
Helena, Mont	7.9	7.6	8.3	8.5	7.2	7.5	6.9	6.3	6.5	6.5	6.9	7.2	8.2	8.8	9.4	8.6	8.2	7.9	7.1	7.1	7.0	7.8	8.3	8.7	7.7
Huron, S. Dak	12.6	13.0	12.8	12.0	12.3	12.1	12.1	11.6	11.6	10.9	11.6	13.1	14.7	15.6	16.5	16.7	15.8	14.2	13.0	13.5	13.3	13.3	12.5	12.2	13.2
Idaho Falls, Idaho	12.2	11.4	11.0	10.6	11.2	10.8	11.3	11.8	11.2	10.5	10.1	11.1	11.3	11.3	12.2	13.2	13.0	12.2	12.5	12.8	12.8	12.0	11.6	11.7	11.7
Independence, Cal	8.4	8.8	7.8	8.2	8.0	7.8	7.2	6.9	7.7	7.1	7.4	6.9	8.1	9.9	10.3	11.2	11.0	10.4	10.0	9.3	10.7	10.2	9.7	8.4	8.8
Indianapolis, Ind	12.9	12.6	12.4	11.9	10.9	11.1	12.0	11.6	11.7	12.4	13.0	13.1	13.1	14.7	14.9	15.0	14.6	13.0	12.0	12.6	12.5	12.7	12.9	12.4	12.7
Jacksonville, Fla	6.2	5.5	6.1	6.4	6.6	6.8	7.2	7.4	7.8	8.7	8.9	9.3	9.0	9.4	9.1	9.5	9.7	9.6	8.8	8.4	8.0	7.6	6.9	6.3	7.9
Jupiter, Fla	9.7	10.0	10.4	10.8	10.4	10.8	10.4	10.9	10.8	12.2	12.7	13.7	14.2	14.8	14.6	13.9	13.2	11.9	10.5	10.3	10.4	10.4	10.2	9.9	11.5
Kansas City, Mo	10.0	9.6	9.0	9.6	10.0	10.0	10.5	10.6	11.3	11.2	11.6	11.8	12.9	12.5	12.2	11.9	10.9	10.4	10.2	9.9	10.5	10.6	10.3	10.0	10.7
Keokuk, Iowa	8.3	7.6	7.1	7.1	7.6	7.7	7.7	8.1	7.9	8.7	9.7	10.3	10.4	10.7	11.0	10.6	10.1	8.9	7.9	7.9	8.2	7.8	7.9	8.2	8.6
Key West, Fla	11.0	10.7	11.1	10.6	10.7	11.1	11.2	11.5	12.5	12.6	13.1	12.9	13.2	13.0	13.1	12.6	12.1	11.6	11.3	10.8	11.5	11.6	11.7	11.4	11.8
Kittyhawk, N. C	14.3	13.9	14.7	15.0	14.9	14.5	14.7	15.5	16.5	17.5	17.5	17.3	17.4	17.8	17.6	17.1	16.9	16.2	15.6	15.7	15.4	15.5	15.2	15.7	15.9
Knoxville, Tenn	7.4	6.9	6.8	6.5	6.1	5.9	6.3	6.1	6.2	6.8	8.1	8.1	9.4	9.0	9.4	9.8	9.7	8.5	8.2	8.5	8.5	8.5	7.3	6.9	7.7
La Crosse, Wis	7.2	7.5	7.7	7.3	7.6	7.7	7.6	7.7	7.5	7.6	7.9	8.5	9.4	10.0	10.0	10.1	9.8	8.5	7.5	7.1	6.4	7.0	6.9	6.7	8.0
Lander, Wyo	3.4	3.6	3.5	3.1	3.6	3.9	3.7	3.7	4.2	3.4	3.2	3.9	4.5	4.5	4.0	5.9	6.4	5.7	5.3	4.9	4.7	4.4	4.8	4.2	4.3
Lexington Ky	13.1	13.4	13.4	13.1	13.1	12.8	12.3	12.9	12.8	12.6	13.6	14.2	14.5	14.8	14.7	14.0	13.3	12.4	12.0	11.8	12.4	12.8	13.4	13.4	13.2
Little Rock, Ark	7.7	7.6	7.7	7.7	7.6	7.7	8.0	8.4	8.0	8.5	9.3	9.2	9.0	8.9	9.2	9.2	9.0	8.8	7.5	7.7	7.7	7.2	7.8	7.5	8.2
Los Angeles, Cal	2.5	2.3	2.4	2.9	2.9	2.8	3.2	3.0	3.5	3.5	3.5	3.5	4.2	4.4	4.6	4.9	5.6	5.9	5.5	4.5	3.3	2.7	2.0	1.9	3.6
Louisville, Ky	9.5	9.5	10.0	10.0	10.1	9.9	9.5	9.3	9.4	9.6	10.2	10.3	10.8	11.4	11.6	11.0	11.4	10.0	9.5	10.3	9.7	9.9	10.2	9.5	10.1
Lynchburg, Va	3.9	3.5	3.9	4.0	3.7	4.2	3.8	4.1	4.1	4.5	4.9	5.4	5.7	5.6	5.6	5.1	4.5	3.5	3.1	2.9	2.7	2.9	3.4	3.5	4.1
Marquette, Mich	11.9	11.7	11.1	11.0	10.8	11.1	10.1	11.1	11.5	11.6	12.2	12.0	13.3	13.2	12.4	12.5	12.2	11.7	11.5	13.2	13.8	13.2	13.4	12.9	12.1
Memphis, Tenn	10.5	10.6	10.8	10.7	10.2	9.8	10.5	10.8	11.0	11.6	12.3	12.1	12.0	12.6	12.3	11.8	11.5	10.9	9.4	9.9	11.5	11.2	11.2	11.0	11.1
Milwaukee, Wis	10.6	10.2	11.3	11.2	11.0	10.5	11.3	11.5	11.1	11.9	13.8	13.7	14.4	14.1	13.8	14.2	13.9	13.1	11.8	11.4	11.4	11.9	11.5	11.2	12.1
Minneapolis, Minn	12.0	12.3	12.3	12.0	12.0	12.4	13.1	12.9	12.7	12.6	12.5	12.9	13.6	13.5	13.3	12.8	12.6	11.6	11.2	11.1	11.4	12.2	13.0	12.2	12.4
Mobile, Ala	7.1	7.3	7.2	6.7	6.8	6.6	6.8	6.7	6.7	7.2	8.2	8.2	8.2	7.7	8.6	9.2	9.2	9.1	9.0	8.2	8.0	7.1	7.0	7.4	7.7
Montgomery, Ala	6.9	5.3	5.5	5.9	5.9	5.7	6.1	6.1	6.5	6.9	7.4	7.8	7.9	7.8	7.5	7.4	7.3	6.9	6.4	5.9	6.3	6.2	6.3	5.8	6.5
Moorhead, Minn	12.1	12.3	12.5	12.1	11.7	11.2	11.7	11.6	11.3	11.3	10.9	11.7	12.2	11.9	11.9	12.3	12.0	11.6	11.6	11.3	11.5	11.7	12.1	11.9	11.8
Mount Tamalpais, Cal	26.0	26.3	26.5	25.5	24.1	24.7	24.3	24.6	24.6	25.5	25.5	25.1	23.6	22.8	21.4	21.2	22.0	22.4	22.0	21.7	22.0	23.2	24.3	25.6	24.0
Nantucket, Mass	13.8	13.3	12.9	12.5	12.5	13.0	13.1	13.1	14.1	14.5	14.6	14.3	14.3	13.6	13.6	13.3	13.1	12.7	13.1	13.4	13.1	13.4	13.6	14.2	13.5
Nashville, Tenn	7.7	7.1	7.6	7.5	8.0	6.8	7.0	7.0	6.9	7.4	8.4	9.5	9.7	9.5	9.7	9.9	9.8	9.3	8.2	8.2	8.1	8.3	7.9	7.1	8.2
Neah, Wash	8.1	8.6	8.9	9.3	9.2	9.0	9.1	9.5	8.9	9.4	10.3	9.7	9.1	10.3	10.2	10.5	10.6	10.3	10.1	9.7	8.6	8.5	8.8	7.8	9.3
New Haven, Conn	10.1	9.7	9.3	8.1	9.4	9.0	8.9	9.0	9.5	10.4	11.6	12.0	12.8	13.1	12.4	11.0	9.6	8.8	8.8	8.8	9.4	9.3	9.6	9.3	10.0
New Orleans, La	8.5	8.2	7.9	7.4	7.7	7.7	7.0	7.6	7.9	8.4	8.8	9.0	10.0	9.5	10.0	10.3	10.2	10.1	8.6	8.2	8.5	8.4	8.7	8.5	8.6
New York, N. Y	14.7	14.0	13.5	13.9	14.6	14.4	14.8	15.1	15.1	16.3	15.7	16.3	17.4	18.0	17.2	17.1	15.8	13.6	14.2	14.3	14.6	14.0	13.9	14.0	15.1

TABLE V.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Norfolk, Va.	9.5	8.7	8.5	8.5	8.5	8.6	9.7	9.5	9.2	10.2	10.9	10.4	11.0	11.6	11.7	11.5	10.5	9.1	9.6	9.9	10.0	9.3	9.3	8.8	9.8
Northfield, Vt.	9.0	10.1	10.5	9.9	10.5	10.2	9.8	10.0	9.9	10.4	11.2	12.2	12.9	12.2	12.0	13.7	9.7	8.7	9.7	10.1	9.9	9.4	9.1	8.7	10.3
North Platte, Nebr.	7.8	8.0	8.1	7.4	7.7	7.3	7.1	6.8	7.2	7.2	7.5	8.3	10.2	12.1	13.0	13.7	12.6	10.9	8.6	8.6	8.5	7.8	8.0	8.4	8.9
Oklahoma, Okla.	8.6	8.8	9.5	9.6	10.0	10.3	10.1	10.4	10.1	10.3	12.3	13.0	13.4	14.1	14.2	13.7	13.0	11.5	9.3	9.1	8.9	9.3	9.5	9.1	10.8
Omaha, Nebr.	7.5	7.7	7.6	8.3	8.6	8.5	7.4	8.2	8.8	8.9	9.3	10.2	10.1	10.1	11.2	10.2	10.3	9.0	7.5	6.7	7.8	7.7	7.9	8.0	8.6
Oswego, N. Y.	15.0	15.1	15.6	15.5	15.2	15.5	15.7	15.4	15.1	14.6	14.6	14.5	15.0	14.9	14.3	13.5	13.2	13.0	13.7	14.0	14.1	14.3	14.5	15.3	14.6
Palestine, Tex.	6.7	6.8	6.8	6.7	7.0	7.1	7.5	6.7	7.3	7.7	8.5	8.3	8.4	9.1	8.9	9.2	9.0	8.0	6.6	6.0	5.4	6.3	6.4	6.6	7.4
Parkersburg, W. Va.	6.6	6.2	6.4	6.7	6.8	6.8	6.9	6.7	7.3	7.7	8.5	8.5	8.5	8.6	8.9	8.1	7.2	6.5	6.1	6.2	6.2	5.8	6.1	6.2	7.0
Pensacola, Fla.	10.7	10.2	10.3	10.5	10.5	9.7	9.5	10.4	10.5	11.5	12.5	12.3	11.3	10.9	11.1	11.4	10.7	10.1	9.4	9.2	9.9	10.2	10.1	10.6	10.6
Philadelphia, Pa.	10.5	10.1	10.5	10.7	10.5	10.2	9.7	10.1	11.0	10.9	11.5	11.6	12.1	11.9	11.9	11.6	11.1	10.3	9.9	9.5	9.5	9.8	10.0	10.3	10.7
Phenix, Ariz.	3.5	3.7	3.5	3.4	3.2	3.5	3.8	3.7	4.1	4.1	4.1	4.2	4.3	4.3	4.5	4.2	3.8	4.0	3.7	3.0	2.9	3.3	3.2	3.0	3.7
Pierre, S. Dak.	8.3	8.5	8.0	7.2	6.8	6.7	6.4	6.7	6.4	6.1	7.8	10.2	12.6	13.7	14.2	14.2	14.3	13.4	10.9	10.1	9.2	9.5	9.6	9.7	9.6
Pittsburg, Pa.	6.5	6.6	6.6	6.6	6.6	6.5	6.6	6.7	7.0	7.1	8.2	8.7	9.1	8.5	8.0	7.7	7.3	7.1	7.5	6.9	7.1	7.2	7.0	6.7	7.3
Point Reyes Lt., Cal.	13.6	13.6	14.5	13.9	13.7	12.9	11.7	11.5	12.7	13.6	13.1	13.4	13.8	14.2	12.6	13.5	14.5	14.5	14.2	13.8	14.2	14.3	14.8	14.6	13.6
Port Huron, Mich.	13.7	13.9	13.4	12.5	12.8	12.9	13.2	13.6	13.9	14.9	15.9	15.7	16.0	15.6	15.0	14.9	14.7	13.5	12.9	12.7	13.3	13.9	13.9	14.1	14.0
Port Crescent, Wash.	3.6	3.7	3.8	3.4	3.4	3.4	3.3	3.3	3.1	3.3	3.2	3.3	3.3	3.8	3.8	4.4	4.8	4.5	4.1	3.8	3.7	3.9	3.8	3.8	3.7
Portland, Me.	6.9	7.5	7.3	7.2	7.5	7.9	7.9	8.2	8.4	9.5	8.5	9.0	9.0	8.8	9.0	8.5	8.4	7.6	7.4	7.1	6.7	6.6	6.6	7.8	7.8
Portland, Oreg.	8.1	8.3	8.6	8.3	9.3	9.8	9.9	9.6	10.0	10.3	10.2	10.3	11.1	11.3	10.4	9.6	9.9	10.5	9.4	9.8	9.1	8.3	7.7	6.4	9.4
Pueblo, Colo.	6.9	6.6	6.9	6.1	6.6	6.9	7.5	7.6	7.0	7.7	6.8	7.8	8.5	8.7	8.0	8.3	7.8	6.6	6.1	5.7	5.0	6.1	5.8	6.5	6.9
Raleigh, N. C.	6.9	6.5	6.3	6.6	6.5	5.9	6.2	6.1	6.3	7.3	6.8	7.9	8.4	8.9	8.8	8.4	7.8	6.2	5.6	5.8	5.6	5.7	5.8	6.0	6.9
Rapid City, S. Dak.	6.9	6.8	6.2	5.6	6.1	6.5	6.6	6.2	6.3	7.3	7.5	7.2	8.0	8.7	8.9	9.8	10.8	9.6	8.4	7.3	7.8	7.3	7.2	6.3	7.5
Red Bluff, Cal.	7.0	6.9	7.2	6.6	6.8	6.9	7.2	6.9	6.6	6.6	7.1	7.3	7.5	8.9	9.0	9.0	9.9	9.8	9.5	8.8	8.2	7.8	7.2	7.5	7.8
Richmond, Va.	6.6	6.5	6.4	6.6	6.3	6.1	6.5	6.2	6.6	6.8	7.1	7.1	8.1	8.9	8.6	9.3	9.6	7.0	6.4	6.3	6.5	6.6	6.1	5.9	7.0
Rochester, N. Y.	10.2	9.8	9.9	9.7	9.9	9.6	9.9	9.5	9.3	9.4	10.1	10.4	10.9	10.8	10.5	9.7	8.3	8.0	6.8	9.8	9.8	10.1	10.1	10.3	10.0
Roseburg, Oreg.	2.9	2.6	2.8	3.1	3.0	2.9	3.6	3.8	3.9	3.6	3.3	3.1	3.0	3.4	4.2	5.0	5.3	4.9	4.5	3.6	3.3	2.8	2.6	2.8	3.5
Sacramento, Cal.	10.1	10.2	10.5	10.2	10.5	9.4	9.5	9.1	9.4	9.1	9.5	10.6	10.6	11.1	11.0	11.2	11.5	11.4	10.9	10.1	9.5	9.3	9.9	10.2	10.2
St. Louis, Mo.	9.8	9.8	9.4	9.3	9.4	9.6	9.8	10.5	10.5	9.4	10.9	10.7	9.7	9.9	10.2	10.7	12.4	11.5	8.7	7.8	7.1	7.5	7.8	8.3	7.9
St. Paul, Minn.	7.6	7.9	8.4	7.9	7.6	7.7	8.1	8.2	8.3	8.0	9.1	9.6	6.0	7.0	7.2	8.0	8.6	8.4	7.8	6.6	5.7	6.4	5.9	5.5	5.3
Salt Lake City, Utah.	4.7	4.8	4.2	4.3	5.7	5.5	5.2	5.2	5.1	5.4	5.4	6.0	6.7	7.0	7.2	8.0	8.6	9.9	10.4	10.2	8.9	9.5	9.8	9.0	8.8
San Antonio, Tex.	8.1	7.6	7.3	8.2	8.2	8.8	8.6	8.4	8.7	9.6	8.1	9.6	10.6	10.5	11.0	10.8	10.8	9.9	9.3	9.4	9.0	6.4	5.8	5.4	5.6
San Diego, Cal.	3.8	4.0	3.9	4.1	4.4	4.1	4.1	4.5	4.2	3.8	3.8	3.0	3.3	4.3	5.9	5.9	7.6	9.2	9.6	9.3	7.6	5.1	3.8	3.9	5.1
Sandusky, Ohio	11.1	10.6	10.1	9.6	9.5	9.4	9.1	9.1	9.7	10.8	10.8	11.2	10.9	11.0	11.2	10.7	9.7	9.5	8.7	9.4	9.7	9.8	9.8	9.8	10.1
Sandy Hook, N. J.	19.0	18.6	18.5	19.0	19.3	19.2	18.8	18.9	19.0	19.2	18.5	19.7	19.1	19.3	18.3	16.8	16.4	16.4	16.1	16.4	17.2	16.7	17.1	17.8	18.2
San Francisco, Cal.	7.8	7.2	6.7	6.2	6.9	6.5	6.3	6.6	6.6	6.9	7.3	7.5	8.6	8.4	8.5	9.7	10.4	9.3	9.5	8.8	9.0	9.0	7.8	8.3	8.3
San Luis Obispo, Cal.	4.7	4.8	5.3	5.5	4.8	4.2	4.5	4.5	4.8	4.4	4.4	5.0	5.9	7.2	8.9	8.9	9.2	9.5	9.5	7.7	7.3	6.4	5.8	5.4	5.6
Santa Fe, N. Mex.	5.1	4.3	4.7	5.5	5.3	5.6	6.3	6.5	7.3	7.7	8.2	8.9	10.1	10.8	10.6	10.2	10.6	10.8	10.1	7.7	4.0	3.9	4.6	5.4	5.1
Sault Ste. Marie, Mich	8.6	8.3	7.9	7.6	7.4	6.9	7.3	7.5	6.9	6.8	7.9	9.2	8.0	9.2	9.5	9.8	9.9	9.9	8.4	8.7	8.9	9.6	9.5	9.5	9.3
Savannah, Ga.	8.0	8.7	8.9	9.1	8.6	8.7	9.0	8.8	9.1	9.7	10.1	10.9	10.0	9.6	10.0	9.9	9.9	9.5	8.6	8.1	8.5	8.3	7.9	8.3	7.9
Seattle, Wash.	5.4	5.3	5.8	5.9	6.0	6.6	6.7	7.3	7.3	7.4	7.0	7.5	6.8	6.8	7.1	7.2	7.4	7.3	6.7	6.7	7.4	7.3	6.9	7.0	6.7
Shreveport, La.	7.0	7.1	6.9	6.5	7.1	7.0	7.3	7.1	7.2	8.6	9.3	9.1	9.1	8.5	8.9	9.2	8.4	8.4	8.6	7.1	7.1	7.9	7.5	7.4	7.6
Sioux City, Iowa.	11.4	12.1	12.5	12.0	13.1	12.9	12.3	12.5	12.6	12.9	13.1	13.7	14.0	15.2	16.0	16.0	15.6	14.5	12.5	12.9	12.3	11.6	12.2	11.9	13.2
Spokane, Wash.	5.0	4.7	4.7	4.8	4.5	4.2	4.4	4.9	4.8	5.7	5.9	5.5	6.0	5.9	6.8	6.6	7.0	6.7	6.5	6.4	5.6	5.2	5.4	5.3	5.5
Springfield, Ill.	9.8	9.5	9.4	9.1	9.3	9.1	9.5	9.4	9.6	10.2	10.9	10.7	10.6	10.6	11.5	12.0	12.9	12.5	12.3	12.3	10.5	9.8	9.8	10.1	10.2
Springfield, Mo.	11.5	10.9	10.8	10.8	10.7	11.0	10.9	10.4	10.5	10.7	11.5	12.0	12.0	12.6	12.5	13.0	12.8	11.3	10.6	10.4	10.8	11.4	11.9	11.9	11.5
Tacoma, Wash.	6.8	6.3	6.1	5.8	6.5	7.0	6.7	7.0	7.1	6.6	6.3	7.0	7.2	7.8	7.6	7.3	7.4	7.9	8.5	8.2	8.0	7.1	6.6	6.7	7.2
Tampa, Fla.	6.9	6.1	6.2	6.0	5.9	6.1	6.6	6.6	6.9	7.2	7.8	8.9	8.9	9.6	9.6	9.0	8.4	7.4	6.5	6.0	6.4	7.1
Toledo, Ohio	12.5	12.2	11.8	11.7	11.6	11.8	11.7	11.4	12.4	13.3	13.5	13.7	14.0	14.5	14.3	14.2	13.6	12.1	12.3	12.3	12.7	13.0	12.8	13.0	12.5
Vicksburg, Miss.	7.8	8.0	8.4	8.2	8.0	7.6	7.7	8.2	7.8	8.0	8.5	8.2	8.4	7.5	7.9	7.2	7.5	7.5	6.7	6.7	6.7	6.9	6.9	7.1	7.0
Vineyard Haven, Mass	10.8	10.7	10.2	10.0	10.1	9.8	9.6	9.6	10.6	11.5	11.9	11.8	12.3	12.2	12.0	11.9	11.5	10.6	10.8	10.8	10.8	11.2	11.4	11.2	11.0
Walla Walla, Wash.	6.3	6.0	5.5	5.5	5.2	5.7	6.1	6.1	6.4	6.5	6.4	6.2	6.5	7.0	7.4	7.4	7.3	7.3	7.3	7.0	7.2	7.5	7.1	6.6	6.4
Washington, D. C.	6.3	6.7	6.7	6.5	6.2	5.7	5.8	6.2	6.4	7.0	7.1	7.9	7.7	8.3	7.8	7.5	6.8	5.9	5.4	5.4	5.5	6.0	6.1	6.0	6.5
Wichita, Kans.	7.9	8.1	8.1	8.3	8.4	8.7	9.8	10.1	10.2	10.4	10.9	11.8	12.4	12.0	12.7	13.2	12.8	11.8	10.6	8.6	7.8	7.7	7.7	8.0	8.7
Williston, N. Dak.	6.6	7.2	6.8	7.1	7.4	7.6	7.6	8.4	9.5	9.7	9.5	9.9	11.8	12.1	10.5	9.4	9.6	9.1	8.5	9.7	8.8	8.6	8.2	8.1	7.6
Wilmington, N. C.	8.5	8.1	8.1	8.1	8.1	7.9	7.6	7.8	8.3	9.1	9.4	9.6	9.9	9.6	9.6	11.2	12.0	12.9	13.2	11.9	11.8	10.7	10.0	10.0	10.4
Winnemucca, Nev.	11.4	10.9	10.4	10.0	10.0	9.2	9.6	9.4	9.3	9.3	10.1	9.8	10.4	11.2	12.0	12.9	13.2	11.9	11.8	8.1	8.5	8.4	8.2	8.1	7.8
Woods Hole, Mass.	17.5	17.3	17.0	15.9	16.5	15.9	15.9	15.9	15.5	15.6	15.9	15.9	16.8	16.7	16.4	15.8	17.4	17.9	18.2	17.7	17.7	17.5	18.5	18.5	16.8
Yankton, S. Dak.	10.0	9.2	9.7	9.9	9.8	9.5	9.9	9.0	8.4	7.8	8.9	10.7	12.3	12.9	13.5	13.9	12.9	11.6	9.7	9.1	9.9	10.8	10.7	10.3	10.4
West Indies.																									
Basseterre, St. Kitts.	10.4	10.6	10.4	10.1	10.1	10.8	10.4	11.4	12.2	12.3	12.5	12.1	11.7	11.5	11.1	10.7	10.5	10.2	10.0	10.6	10.4	10.2	10.3	10.2	10.9
Bridgetown, Bar.	6.6	6.7	6.6	6.0	6.4	6.6	8.0	10.5	12.6	13.1	13.4	6.8	13.5	13.1	12.3	11.4	9.3	6.7	6.1	6.1	6.3	6.5	6.4	6.5	8.9
Colon, U. S. C.	6.5	6.5	6.2	6.2	6.1	5.9	5.8	5.9	6.2	6.5	6.8	6.8	7.6	7.7	7.5	8.0	8.0	6.9	6.5	6.3	4.5	4.8	4.8	4.8	4.7
Kingston, Jamaica.	5.2	5.4	5.2	5.5	5.9	5.8	5.6	5.3	3.9	3.6	5.3	7.5	8.0	8.2	9.7	11.6	11.5	10.3	8.5	5.9	4.0	2.7	2.8	2.7	2.6
Port of Spain, Trin'd.	2.1	2.0	2.0	2.2	2.3	1.9	1.8	3.7	5.9	7.4	7.5	8.0	8.2	8.2	8.4	7.0	5.5	3.8	3.0	2.7	2.5
San Juan, Porto Rico.	4.6	4.8	4.4	4.0	3.8	4.3	3.9	4.5	7.0	8.7	9.7	10.9	11.5	11.6	11.2	11.1	10.2	8.9	7.9	6.6	6.2	5.7	5.4	4.6	7.2
Santiago de Cuba.	3.6	3.7	3.4	3.2	3.5	3.8	3.4	3.7	4.8	5.9	6.5	7.3	8.3	8.6	8.4	7.8	7.0	4.9	3.6	3.5	3.6	3.6	3.6	3.8	5.0
Santo Domingo, S. D.	3.4	3.5	3.7	3.5	3.6	3.7	3.6	4.1	4.7	4.8	5.0	5.6	5.3	5.7	6.1	5.5	5.3	3.9	3.3	3.1	3.2	3.3	3.5	3.3	4.2
Willemstad, Curaçao.	9.9	10.2	9.9	10.2	9.8	9.5	9.7	11.9	13.9	15.1	15.4	15.6	15.7	15.7	15.8	15.5	14.5	12.5	11.2	11.3	11.1	10.8	10.4	10.7	12.3

TABLE VI.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of January, 1899.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	20	13	6	37	n. 76 w.	32
Portland, Me	18	15	4	40	n. 85 w.	36
Northfield, Vt	18	38	2	11	s. 24 w.	22
Boston, Mass	17	17	3	38	n. 74 w.	36
Nantucket, Mass	23	14	4	37	n. 75 w.	34
Woods Hole, Mass.*	9	13	2	15	s. 73 w.	14
Block Island, R. I	26	11	5	35	n. 63 w.	34
New Haven, Conn	25	25	3	30	w.	27
Middle Atlantic States.						
Albany, N. Y	19	26	10	20	s. 55 w.	12
Binghamton, N. Y.†	9	6	9	11	n. 34 w.	4
New York, N. Y	22	17	9	29	n. 76 w.	21
Harrisburg, Pa.†	8	5	10	14	n. 53 w.	5
Philadelphia, Pa	25	18	10	22	n. 60 w.	14
Atlantic City, N. J	25	15	8	27	n. 62 w.	22
Baltimore, Md	22	18	17	22	n. 51 w.	6
Cape May, N. J	24	22	7	20	n. 81 w.	13
Washington, D. C	26	20	10	17	n. 49 w.	9
Lynchburg, Va	22	18	21	22	n. 14 w.	4
Norfolk, Va	24	26	17	12	s. 68 e.	5
Richmond, Va	21	27	10	14	s. 34 w.	7
South Atlantic States.						
Charlotte, N. C	21	25	17	17	s.	4
Hatteras, N. C	28	20	7	16	n. 48 w.	12
Raleigh, N. C	27	20	8	20	n. 60 w.	14
Wilmington, N. C	25	17	14	21	n. 41 w.	11
Charleston, S. C	30	15	13	18	n. 16 w.	16
Augusta, Ga	29	9	12	22	n. 27 w.	22
Savannah, Ga	28	17	11	19	n. 3 w.	14
Jacksonville, Fla	35	14	18	14	n. 11 e.	21
Florida Peninsula.						
Jupiter, Fla	18	16	16	18	n. 45 w.	3
Key West, Fla	25	8	40	2	n. 66 e.	4
Tampa, Fla	30	12	29	9	n. 48 e.	27
Eastern Gulf States.						
Atlanta, Ga	18	14	23	22	n. 14 e.	1
Pensacola, Fla	27	12	25	8	n. 48 e.	23
Mobile, Ala	31	15	14	9	n. 16 e.	19
Montgomery, Ala	18	16	27	14	n. 81 e.	13
Meridian, Miss.†	15	5	9	5	n. 22 e.	11
Vicksburg, Miss	20	24	29	6	s. 80 e.	23
New Orleans, La	27	18	18	12	s. 29 e.	12
Western Gulf States.						
Shreveport, La	19	25	25	11	s. 67 e.	15
Fort Smith, Ark	16	10	35	11	n. 76 e.	25
Little Rock, Ark	20	21	16	19	s. 72 w.	3
Corpus Christi, Tex	30	17	20	8	n. 43 e.	18
Fort Worth, Tex†	10	21	5	12	s. 32 w.	13
Galveston, Tex	23	14	30	10	n. 66 e.	22
Palestine, Tex	25	21	18	13	n. 51 e.	6
San Antonio, Tex	25	22	25	8	n. 80 e.	17
Ohio Valley and Tennessee.						
Chattanooga, Tenn	14	28	15	15	s.	14
Knoxville, Tenn	26	16	13	22	n. 42 w.	14
Memphis, Tenn	25	23	14	13	n. 27 e.	2
Nashville, Tenn	29	25	9	20	n. 70 w.	12
Lexington, Ky.†	9	15	6	6	s.	6
Louisville, Ky	17	34	12	15	s. 10 w.	17
Evansville, Ind.†	8	16	5	4	s. 7 e.	8
Indianapolis, Ind	18	28	10	20	s. 45 w.	14
Cincinnati, Ohio	17	28	14	20	s. 29 w.	12
Columbus, Ohio	16	26	9	22	s. 52 w.	16
Pittsburg, Pa	20	23	9	24	s. 79 w.	15
Parkersburg, W. Va	17	29	11	18	s. 30 w.	14
Elkins, W. Va	17	18	3	31	s. 88 w.	28
Lower Lake Region.						
Buffalo, N. Y	11	30	12	35	s. 69 w.	25
Oswego, N. Y	11	33	13	21	s. 20 w.	23
Rochester, N. Y	11	25	6	39	s. 67 w.	36
Erie, Pa	7	29	7	29	s. 45 w.	31
Cleveland, Ohio	12	33	17	18	s. 3 w.	21
Sandusky, Ohio	13	24	12	31	s. 36 w.	14
Toledo, Ohio	12	22	8	33	s. 68 w.	27
Detroit, Mich	12	26	9	35	s. 62 w.	30
Upper Lake Region.						
Alpena, Mich	10	25	3	34	s. 64 w.	34
Escanaba, Mich	15	23	5	34	s. 75 w.	30
Grand Haven, Mich	16	20	13	27	s. 74 w.	15
Marquette, Mich	11	25	5	33	s. 63 w.	31
Port Huron, Mich	9	35	8	20	s. 24 w.	30
Sault Ste. Marie, Mich	12	21	24	20	s. 24 e.	10
Chicago, Ill	18	23	9	29	s. 76 w.	21
Milwaukee, Wis	14	21	7	35	s. 76 w.	29
Green Bay, Wis	13	29	6	26	s. 51 w.	26
Duluth, Minn	10	24	8	38	s. 65 w.	33
North Dakota.						
Moorhead, Minn	20	19	15	24	n. 84 w.	9
Bismarck, N. Dak	28	8	13	28	n. 37 w.	25
Williston, N. Dak	21	13	13	29	n. 63 w.	18
Upper Mississippi Valley.						
St. Paul, Minn	15	26	16	26	s. 42 w.	15
La Crosse, Wis.†	6	18	4	11	s. 34 w.	14
Davenport, Iowa	12	22	13	27	s. 54 w.	17
Des Moines, Iowa	17	23	6	31	s. 57 w.	30
Dubuque, Iowa	10	29	14	25	s. 30 w.	22
Keokuk, Iowa	15	27	11	25	s. 49 w.	18
Cairo, Ill	23	28	8	13	s. 45 w.	7
Springfield, Ill	18	26	7	20	s. 58 w.	15
Hannibal, Mo.†	9	12	2	13	s. 75 w.	11
St. Louis, Mo	20	30	9	12	s. 17 w.	10
Missouri Valley.						
Columbia, Mo.*	7	12	7	7	s.	5
Kansas City, Mo	17	29	17	18	s. 5 w.	12
Springfield, Mo	15	32	15	12	s. 10 e.	17
Lincoln, Nebr	20	28	6	21	s. 62 w.	17
Omaha, Nebr	17	25	7	26	s. 67 w.	21
Sioux City, Iowa†	7	16	4	12	s. 42 w.	12
Pierre, S. Dak	23	10	19	28	n. 35 w.	16
Huron, S. Dak	16	18	16	26	s. 40 w.	16
Yankton, S. Dak†	6	10	3	17	s. 74 w.	15
Northern Slope.						
Havre, Mont	14	18	12	35	s. 80 w.	23
Miles City, Mont	18	20	2	30	s. 86 w.	28
Helena, Mont	21	14	2	38	n. 79 w.	37
Rapid City, S. Dak	21	11	10	32	n. 66 w.	24
Cheyenne, Wyo	22	10	1	44	n. 75 w.	45
Lander, Wyo	13	28	12	29	s. 48 w.	23
North Platte, Nebr	34	16	6	33	n. 73 w.	28
Middle Slope.						
Denver, Colo	14	28	7	23	s. 49 w.	21
Pueblo, Colo	26	12	15	22	n. 27 w.	16
Concordia, Kans	14	32	4	18	s. 38 w.	23
Dodge, Kans	20	17	12	22	n. 73 w.	10
Wichita, Kans	20	30	9	9	s.	10
Oklahoma, Okla	23	30	6	11	s. 36 w.	9
Southern Slope.						
Abilene, Tex	20	26	11	20	s. 56 w.	11
Amarillo, Tex	23	23	7	15	w.	8
Southern Plateau.						
El Paso, Tex	29	2	8	30	n. 39 w.	35
Santa Fe, N. Mex	33	9	29	10	n. 39 e.	31
Flagstaff, Ariz	23	13	19	24	n. 27 w.	11
Phenix, Ariz	17	9	26	23	n. 21 e.	8
Yuma, Ariz	38	5	20	15	n. 9 e.	33
Independence, Cal	31	6	5	35	n. 50 w.	39
Middle Plateau.						
Carson City, Nev	16	21	9	25	s. 73 w.	17
Winnemucca, Nev	10	36	6	21	s. 30 w.	30
Salt Lake City, Utah	8	32	20	19	s. 2 e.	24
Grand Junction, Colo	22	9	20	26	n. 25 w.	14
Northern Plateau.						
Baker City, Oreg	11	37	17	14	s. 7 e.	26
Boise, Idaho	17	20	26	16	s. 73 e.	10
Idaho Falls, Idaho	15	38	0	12	s. 28 w.	26
Spokane, Wash	11	25	15	26	s. 38 w.	18
Walla Walla, Wash	7	40	5	23	s. 29 w.	38
North Pacific Coast Region.						
Fort Canby, Wash	3	24	28	15	s. 31 e.	25
Neah, Wash	0	8	32	21	s. 54 e.	14
Port Crescent, Wash.*	4	11	9	16	s. 45 w.	10
Seattle, Wash	12	34	21	4	s. 18 e.	23
Tacoma, Wash	10	34	9	24	s. 32 w.	28
Portland, Oreg	14	31	13	11	s. 7 e.	17
Roseburg, Oreg	8	30	18	21	s. 8 w.	22
Middle Pacific Coast Region.						
Eureka, Cal	16	26	21	19	s. 11 e.	10
Mount Tamalpais, Cal	31	12	15	19	n. 12 w.	19
Red Bluff, Cal	34	17	6	19	n. 38 w.	22
Sacramento, Cal	22	24	23	8	s. 82 e.	15
San Francisco, Cal	25	14	16	21	n. 24 w.	12
South Pacific Coast Region.						
Fresno, Cal	24	14	19	19	n.	10
Los Angeles, Cal	17	16	17	24	n. 82 w.	7
San Diego, Cal	30	9	17	24	n. 18 w.	22
San Luis Obispo, Cal	34	15	3	12	n. 25 w.	21
West Indies.						
Basseterre, St. Kitts Island	15	0	56	0	n. 76 e.	58
Bridgetown, Barbados	22	0	53	0	n. 67 e.	56
Colon, U. S. C	43	3	31	5	n. 33 e.	48
Kingston, Jamaica	34	9	28	10	n. 36 e.	31
Port of Spain, Trinidad	30	2	42	2	n. 55 e.	49
San Juan, Porto Rico	2	21	47	4	s. 66 e.	47
Santiago de Cuba, Cuba	29	14	23	7	n. 47 e.	22
Santo Domingo, Santo Domingo	47	6	14	5	n. 12 e.	42
Willemstad, Curaçao	1	1	62	0	e.	62

* From observations at 8 p. m. only. † From observations at 8 a. m. only

TABLE VII.—*Thunderstorms and auroras, January, 1899.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	53	T.					2					4						3																9	3	T.
		A.																																0	0	A.
Arizona	53	T.																																0	0	T.
		A.																																0	0	A.
Arkansas	57	T.				15	1	1			1	1	2	7	9	3		1							2		1							44	12	T.
		A.	1																															1	1	A.
California	189	T.											5									1												6	2	T.
		A.																																0	0	A.
Colorado	73	T.																																0	0	T.
		A.																																0	0	A.
Connecticut	22	T.																								5	13				1			19	3	T.
		A.																																0	0	A.
Delaware	5	T.																								2								2	1	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.																								1								1	1	T.
		A.																																0	0	A.
Florida	45	T.														2		4	4						4								4	18	3	T.
		A.																																0	0	A.
Georgia	54	T.						1				1						1	1			1			3	1								9	3	T.
		A.																																0	0	A.
Idaho	27	T.																																0	0	T.
		A.																																0	0	A.
Illinois	92	T.				4									4																			8	2	T.
		A.		1													1							2						2				6	4	A.
Indiana	55	T.			1	4							2	6	3										1	1							18	7	T.
		A.																																0	0	A.
Indian Territory	8	T.																																0	0	T.
		A.																																0	0	A.
Iowa	126	T.																																0	0	T.
		A.																																0	0	A.
Kansas	74	T.																												2		1		3	2	T.
		A.																																0	0	A.
Kentucky	45	T.				1	1						3	11	5										2									23	6	T.
		A.																																0	0	A.
Louisiana	45	T.		1	4													1			3													14	6	T.
		A.																																0	0	A.
Maine	17	T.																													2	3		14	6	T.
		A.																																0	0	A.
Maryland	39	T.																												1				1	1	T.
		A.																								23								23	1	A.
Massachusetts	54	T.																1	1							2	3							7	4	T.
		A.											1							1														2	2	A.
Michigan	107	T.																																0	0	T.
		A.							1			1																		1	2	3	1		9	6	T.
Minnesota	64	T.																																0	0	T.
		A.				6	3				1	2		7			2	2	1					1						6	4	1		12	4	A.
Mississippi	42	T.																						2										26	9	T.
		A.												2	1																			3	2	A.
Missouri	89	T.																																0	0	T.
		A.																																0	0	A.
Montana	37	T.																																0	0	T.
		A.																												2				2	1	A.
Nebraska	145	T.																																0	0	T.
		A.																											1	1				2	2	A.
Nevada	45	T.																																0	0	T.
		A.																																0	0	A.
New Hampshire	20	T.									1		1																					4	3	T.
		A.																								32	2				1	1		35	3	A.
New Jersey	50	T.						1							1																			3	3	T.
		A.												1																				0	0	A.
New Mexico	38	T.																								6	2				1			9	2	T.
		A.		1																										1				2	2	A.
New York	103	T.					1																			14								15	2	T.
		A.																																0	0	A.
North Carolina	56	T.				1												2												1				12	4	T.
		A.																																0	0	A.
North Dakota	40	T.																																0	0	T.
		A.																																0	0	A.
Ohio	124	T.				1												2												1	8			12	4	T.
		A.				4							1	16	25																			46	5	A.
Oklahoma	22	T.													1							1								1		1	1	5	2	T.
		A.												3	2																			5	1	A.
Oregon	71	T.																												1				1	1	T.
		A.												1	2																			3	2	A.
Pennsylvania	100	T.																																0	0	T.
		A.													1										5	1								7	3	A.
Rhode Island	8	T.																																0	0	T.
		A.		1																						1								1	1	A.
South Carolina	44	T.						1							1		2								6									10	4	T.
		A.																																0	0	A.
South Dakota	52	T.																																0	0	T.
		A.																																0	0	A.
Tennessee	61	T.				3								4								1			2									9	3	T.
		A.																																0	0	A.
Texas	83	T.				2	5	4			4	1	3		3	1	3	1				1												28	11	T.
		A.																																0	0	A.
Utah	34	T.																																0	0	T.
		A.																																0	0	A.
Vermont	14	T.																								2								2	1	T.
		A.										1																						1	1	A.
Virginia	47	T.					1								1										15									18	3	T.
		A.												2	3																			5	2	A.
Washington	55	T.																																0	0	T.
		A.																							3									3	1	A.
West Virginia	38	T.																																0	0	T.
		A.																																0	0	A.
Wisconsin	60	T.																																0	0	T.
		A.																1	1											3				5	3	A.
Wyoming	18	T.																																0	0	T.
		A.																													1			1	1	A.
Sums	2,804	T.	0	1	5	39	13	8	0	0	6	9	10	22	60	50	5	16	8	0	3	3	0	1	11	122	24	0	0	0	1	2	7	426	...	T.
		A	1	3	0	1	0	1	1	0	1	2	2	0	1	1	1	0	3	2	0	1	1	2	1	0	0	4	4	35	6	4	1	79	....	A.

TABLE VIII.—*Average hourly sunshine (in percentages), January, 1899.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	*Hours.*		
Albany, N. Y	T.	.....	.....	.. ...	38	33	51	58	63	67	66	60	41	38	33	.....	.....	153.1	292.7	52	42
Atlanta, Ga	T.	.....	.....	20	29	33	42	45	46	48	45	42	29	28	29	.....	.....	121.8	316.2	38	35
Atlantic City, N.J	P.	.....	.....	.....	47	51	56	62	57	55	59	63	60	56	60	.....	.....	173.2	303.8	57	47
Baltimore, Md	T.	.....	.....	.....	31	47	65	72	80	80	78	72	63	49	57	.....	.....	195.8	303.8	64	51
Binghamton, N. Y	T.	....	.....	.....	21	32	51	64	63	53	56	52	48	30	15	.....	.....	142.4	295.5	48	41
Bismarck, N. Dak	P.	.....	.....	.....	68	65	54	56	53	46	57	57	42	44	0	.....	.....	149.8	279.9	54	48
Boise	P.	.....	.....	.....	16	16	23	25	23	18	19	21	13	12	33	.....	.....	54.6	289.7	19	23
Boston, Mass	T.	.....	.....	.....	34	47	59	70	74	73	71	69	64	55	31	.....	.....	185.2	295.5	63	57
Buffalo, N. Y	T.	.....	.....	.....	11	12	23	32	45	48	43	29	22	14	0	.....	.....	84.2	292.7	29	18
Charleston, S. C	T.	.....	.....	50	24	31	37	44	54	57	53	51	37	25	20	.....	.....	129.9	318.5	41	41
Chattanooga, Tenn	T.	.....	.....	0	26	28	39	45	50	48	40	38	35	27	23	.....	.....	117.7	314.6	37	37
Cheyenne, Wyo	P.	....	.....	.....	50	59	68	73	74	74	80	72	69	44	6	.....	.....	199.0	298.4	67	49
Chicago, Ill	T.	.....	.....	.....	25	32	42	51	53	61	67	62	47	43	62	.....	.....	145.8	295.5	49	45
Cincinnati, Ohio	T.	.....	.....	.....	38	44	47	50	49	49	51	50	35	39	60	.....	.....	138.3	303.8	46	41
Cleveland, Ohio	T.	.....	.....	.....	30	29	31	39	43	37	23	20	18	13	0	.....	.....	83.4	295.5	28	38
Columbia, Mo	T.	.....	.....	.....	45	51	55	58	56	57	55	55	52	56	50	.....	... .	164.8	303.8	54	37
Columbus, Ohio	T.	.....	.....	.....	43	38	33	33	32	28	27	26	25	36	67	.....	.....	96.6	301.1	32	45
Denver, Colo	P.	.....	. ...	.....	50	77	81	80	82	83	86	79	78	70	38	.....	.....	232.5	301.1	77	62
Des Moines, Iowa	T.	.....	.....	.....	37	34	52	64	74	75	77	76	62	58	69	.....	.....	183.3	295.5	62	55
Detroit, Mich	T.	.....	.....	.....	19	25	41	43	48	52	50	34	22	13	31	.....	.....	105.3	295.5	36	30
Dodge, Kans	P.	.....	.....	.....	60	59	65	72	73	69	77	72	65	45	44	.....	.....	200.4	306.5	65	52
Dubuque, Iowa	T.	.....	.....	.....	41	40	52	64	70	70	74	65	57	52	69	.....	....	174.8	295.5	59	55
Eastport, Me	P.	.....	.....	.....	33	44	52	60	64	55	59	52	45	39	33	....	.....	147.8	286.7	52	42
Erie, Pa	T.	.....	.....	.....	13	17	27	36	36	34	29	29	21	24	8	.....	.... .	30.0	295.5	27	25
Escanaba, Mich	T.	.....	.....	.....	31	24	40	51	49	51	46	41	26	28	100	.....	.....	112.2	283.1	40	41
Eureka, Cal	P.	.....	.....	.....	28	26	35	42	45	45	42	45	39	37	71	.....	.....	116.3	298.4	39	31
Fresno, Cal.*	T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	. . .	.....	...	....	42
Galveston, Tex	P.	.....	.....	6	21	43	47	55	52	53	55	54	54	41	30	.....	.....	151.2	326.8	46	39
Grand Junction, Colo	P.	.....	.....	.....	35	38	56	69	73	77	69	65	58	61	90	.....	. ....	185.5	303.8	61	45
Harrisburg, Pa	T.	.....	.....	.....	30	32	38	42	51	53	49	46	43	35	42	.....	.....	127.4	301.1	42	41
Helena, Mont	P.	.....	.....	.....	15	18	22	28	34	36	35	39	28	25	0	.....	.....	81.0	279.9	29	24
Huron, S. Dak	T.	.....	.....	. ....	61	62	71	77	82	80	80	69	61	53	33	.....	.....	208.2	289.7	70	59
Idaho Falls, Idaho	T.	.....	....	.....	0	0	0	9	11	13	16	10	6	2	0	.....	.....	21.0	292.7	7	6
Indianapolis, Ind	T.	.. ...	.....	.....	27	30	37	46	39	43	44	35	29	30	50	.....	.....	109.7	301.1	36	29
Jacksonville, Fla	T.	.....	.....	17	15	30	44	54	56	54	53	53	44	39	19	.....	.....	136.7	324.9	42	31
Kansas City, Mo	P.	.....	.....	.....	60	60	57	53	54	44	51	53	51	52	70	.....	.....	162.5	303.8	53	49
Key West, Fla	T.	.....	... ..	35	39	62	78	89	92	91	89	82	70	51	37	.....	.....	239.4	334.2	72	48
Knoxville, Tenn	T.	.....	.....	.....	26	41	52	55	66	67	61	62	49	42	41	.....	.....	162.8	311.8	52	46
Lexington, Ky	T	.....	.....	.....	20	26	43	46	52	53	49	45	35	32	26	.....	.....	128.5	306.5	40	30
Little Rock, Ark	T.	.....	.....	0	35	36	45	52	55	59	60	57	52	46	44	.....	.....	156.3	314.6	50	43
Los Angeles, Cal	P.	.....	.....	10	65	72	79	80	79	77	76	75	76	76	75	.....	.....	238.5	316.2	75	62
Louisville, Ky	T.	.....	.....	.....	26	30	32	36	38	36	34	32	33	31	31	.....	.....	101.0	306.5	33	26
Minneapolis, Minn	T.	.....	.....	.....	49	46	58	63	65	71	66	57	55	54	67	....	.....	160.0	286.7	59	.....
Mount Tamalpais, Cal	P.	.....	.....	.....	60	57	56	62	60	57	57	54	57	49	72	.....	.....	174.9	306.5	5.	40
Nashville, Tenn	T.	.....	.....	.....	26	29	35	44	47	44	47	44	34	24	29	.....	.....	115.7	311.8	37	37
New Orleans, La	T.	.....	.....	12	10	12	24	35	41	47	47	41	35	33	38	... .	.....	105.5	324.9	32	35
New York, N. Y	T.	.....	.....	.....	36	46	62	67	71	74	68	6	59	41	35	.....	.....	177.9	298.4	60	50
Northfield, Vt	P.	.....	.....	.....	31	35	51	56	57	55	61	63	52	45	83	.....	.....	149.8	289.7	52	40
Oklahoma, Okla	T.	.....	.....	0	52	55	60	66	71	69	67	66	57	46	48	.. ...	.....	190.7	314.6	61	56
Omaha, Nebr	P.	.....	.....	.....	47	51	63	66	70	75	74	75	64	51	41	.... .	... ..	191.4	298.4	64	63
Parkersburg, W. Va	T.	.....	.....	.....	16	31	48	61	59	69	62	46	32	17	17	.....	.....	135.7	303.8	45	39
Phenix, Ariz	P.	.....	.....	91	71	76	87	91	88	90	89	88	80	85	83	.....	.....	269.2	318.5	85	71
Philadelphia, Pa	T.	.....	.....	.....	39	41	55	61	63	61	62	59	56	38	25	.....	.....	162.4	301.1	54	41
Pittsburg, Pa	T.	.....	.....	.....	3	5	15	33	40	45	31	22	10	6	0	.....	.....	64.7	298.4	22	35
Portland, Me	T.	.....	.....	.....	34	44	56	77	77	79	75	68	64	51	50	.....	.....	186.5	289.7	64	51
Portland, Oreg	T.	.....	.....	.....	2	3	3	6	6	14	21	13	4	7	0	.....	.....	24.5	283.1	8	13
Raleigh, N. C	T.	.....	.....	.....	23	25	36	48	55	57	58	50	42	39	41	.....	.....	135.5	311.8	43	44
Rochester, N. Y	T.	.....	.....	.....	24	20	26	39	43	33	40	32	12	20	22	.....	.....	85.6	292.7	29	28
St. Louis, Mo	T.	.....	.....	.....	26	29	41	52	64	65	65	59	54	42	60	.....	.....	153.3	303.8	50	40
St. Paul, Minn	P.	.....	.....	.....	58	55	56	62	64	67	67	63	61	66	100	....	.....	178.3	286.7	62	55
Salt Lake City, Utah	P.	.....	.....	.....	24	28	30	35	34	30	42	46	31	15	12	.....	.....	94.4	298.4	32	21
San Diego, Cal	P.	.....	.....	22	64	65	75	75	79	80	83	85	84	81	81	.....	.....	245.4	318.5	77	73
San Francisco, Cal	T.	.....	.....	.....	7	24	46	59	67	68	66	64	60	27	31	.....	.....	152.1	306.5	50	33
Santa Fe, N. Mex	P.	.....	.....	.....	68	82	85	84	81	83	80	84	80	72	69	.....	.....	248.7	311.8	80	77
Savannah, Ga	T.	.....	.....	25	27	26	43	59	58	57	55	54	45	41	28	.....	.....	147.0	320.5	46	36
Seattle, Wash	T.	.....	....	.....	3	9	12	23	28	26	24	23	8	4	.....	.....	.....	48.2	276.2	17	13
Spokane, Wash	T.	.....	.....	.....	3	5	9	13	25	34	35	38	21	23	.. ...	.....	. ....	60.3	276.2	22	25
Tacoma, Wash	T.	.....	.....	.....	6	7	15	22	24	25	20	18	12	10	0	.....	... ..	47.2	279.9	17	10
Tampa, Fla	T.	.....	.....	16	16	22	40	39	47	59	51	50	48	30	28	.....	.....	129.1	328.7	39	35
Topeka, Kans	T.	.....	.....	.....	46	44	49	60	56	60	53	53	54	47	43	.....	.....	158.5	303.8	52	46
Vicksburg, Miss	T.	....	.....	7	13	13	24	37	39	44	44	47	38	36	32	.....	.....	106.8	320.5	33	36
Washington, D. C	P.	.....	.....	.....	42	46	53	57	53	58	58	54	47	42	43	.....	.....	155.4	303.8	51	49
Wilmington, N. C	T.	.....	.....	30	23	28	44	64	65	63	55	51	45	36	30	.....	.....	148.6	316.2	47	44
Yankton, S. Dak	T.	.....	.....	.....	39	55	75	91	95	93	89	86	71	49	11	.....	.....	222.7	292.7	76	52
Bridgetown, Barbados	T.	.....	... .	43	48	45	51	54	46	32	36	30	21	18	25	60	.....	133.3	355.5	38	36
Colon, United States of Columbia	T.	.. ..	.....	18	21	17	33	50	52	54	45	33	18	16	5	0	.....	110.4	362.1	30	27
Kingston, Jamaica, W. I	T.	. ..	.....	13	13	28	52	47	47	45	38	33	16	5	4	.....	.....	103.4	347.5	30	39
Port of Spain, Trinidad, W. I	T.	.....	.....	58	72	84	93	96	90	90	85	80	72	48	58	75	.....	279.4	359.0	78	45
San Juan, Porto Rico	T.	.....	.....	10	39	65	64	73	65	68	71	74	59	48	19	.....	.....	199.5	347.5	57	69
Santiago de Cuba, Cuba	T.	.....	.....	84	84	89	93	95	90	95	92	90	78	69	62	.....	.....	294.9	344.0	86	71
Santo Domingo, Santo Domingo, W. I	T.	.....	.....	76	71	65	80	80	75	69	66	63	40	31	49	.....	.....	220.1	347.5	63	57
Willemstad, Curaçao	T.	.....	.....	19	68	82	93	96	88	93	93	98	92	84	56	50	.....	294.3	357.6	82	58

*Instrument out of order.

TABLE IX.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during January, 1899, at all stations furnished with self-registering gauges.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amt of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	6-7			0.97														*			
Atlanta, Ga.	10			1.00														0.43			
Atlantic City, N. J.	16-17			0.48														0.17			
Baltimore, Md.	6-7			1.22														*			
Binghamton, N. Y.	24-25			0.69														*			
Bismarck, N. Dak.	14			0.03														*			
Boise, Idaho	14-15			0.54														0.13			
Boston, Mass.	24-25			1.80														0.39			
Buffalo, N. Y.	14			0.70														0.19			
Cairo, Ill.	12-13			2.51														0.44			
Charleston, S. C.	24			0.41														0.35			
Chicago, Ill.	4			0.24														*			
Cincinnati, Ohio	13-14			1.28														0.41			
Cleveland, Ohio	13-14			0.90														0.37			
Columbia, Mo.	4			0.27														0.19			
Columbus, Ohio	13-14			1.61														0.33			
Denver, Colo.	26-27			0.21														0.10			
Des Moines, Iowa	12			0.12														0.07			
Detroit, Mich.	13-14			0.59														*			
Dodge, Kans	30			0.04														*			
Duluth, Minn.	25-26			0.36														*			
Eastport, Me.	24-25			1.05														*			
Erie, Pa.	14			0.65														*			
Escanaba, Mich.	24			0.47														*			
Fort Worth, Tex.	5			0.47														0.22			
Fresno, Cal.	9-10			0.84														*			
Galveston, Tex.	5-6	11.45 p. m.	9.57 a. m.	0.97	2.40 a. m.	2.55 a. m.	0.08	0.27	0.50	0.63	0.65	0.69	0.70								
Do	9-10	4.27 p. m.	2.35 a. m.	2.01	11.35 p. m.	12.30 a. m.	0.11	0.05	0.08	0.19	0.30	0.41	0.52	0.84	1.15	1.37	1.73	1.87			
Hannibal, Mo.	4			0.16														0.08			
Harrisburg, Pa.	6-7			1.09														*			
Hatteras, N. C.	16			1.00														0.45			
Huron, S. Dak.	22			0.15														*			
Idaho Falls, Idaho	11			0.26														*			
Indianapolis, Ind.	4			1.42														0.42			
Jacksonville, Fla.	26-28			1.75														0.42			
Jupiter, Fla.	13	D. N.	4.35 a. m.	0.67	4.00 a. m.	4.20 a. m.	0.05	0.05	0.35	0.45	0.60	0.62									
Do	27	12.30 p. m.	8.30 p. m.	0.71	3.40 p. m.	3.50 p. m.	0.08	0.22	0.40												
Kansas City, Mo.	12			0.12														*			
Key West, Fla.	18	3.20 a. m.	5.40 a. m.	2.04	3.40 a. m.	4.17 a. m.	0.05	0.05	0.19	0.35	0.65	1.05	1.31	1.40	1.49						
Do	23	4.56 p. m.	D. N.	1.55	10.15 p. m.	11.00 p. m.	0.28	0.05	0.30	0.42	0.48	0.65	0.80	1.04	1.14	1.21	1.25				
Knoxville, Tenn.	3-4			1.15														0.23			
Lincoln, Nebr.	28			0.04														*			
Little Rock, Ark.	12-13			4.12														0.52			
Los Angeles, Cal.	10-11			1.70														0.35			
Louisville, Ky.	13-14			1.29														0.33			
Memphis, Tenn.	12	2.00 a. m.	1.10 p. m.	1.63	4.45 a. m.	5.10 a. m.	0.05	0.11	0.17	0.26	0.34	0.44	0.45	0.47	0.48	0.50	0.53	0.64			
Milwaukee, Wis.	6			0.19														0.03			
Montgomery, Ala.	16			1.08														0.60			
Nantucket, Mass.	16-17			0.57														0.21			
Nashville, Tenn.	5-6			1.34														0.28			
New Orleans, La.	16			0.82														*			
New York, N. Y.	5-7			1.50														0.39			
Norfolk, Va.	14			0.91														0.65			
Northfield, Vt.	14-15			0.70														*			
Oklahoma, Okla.	4			0.25														*			
Omaha, Nebr.	28			0.03														0.01			
Parkersburg, W. Va.	3-4			1.12														0.18			
Philadelphia, Pa.	5-7			1.37														0.40			
Pittsburg, Pa.	23-24			1.19														*			
Portland, Me.	24-25			0.76														0.24			
Portland, Oreg.	10			0.54														0.23			
Raleigh, N. C.	14			0.60														0.46			
Richmond, Va.	5-7			1.07														0.18			
Rochester, N. Y.	14			0.49														*			
St. Louis, Mo.	13-14			0.66														0.11			
St. Paul, Minn.	22-23			0.49														0.17			
Salt Lake City, Utah	15-16			0.42														*			
San Diego, Cal.	10	6.05 p. m.	11.59 p. m.	1.20	10.50 p. m.	11.30 p. m.	0.50	0.15	0.26	0.29	0.37	0.40	0.46	0.55	0.60	0.62	0.65	0.70			
San Francisco, Cal.	6-7			0.96														0.18			
Savannah, Ga.	10			1.02														0.49			
Seattle, Wash.	14-16			1.23														0.07			
Spokane, Wash.	*																				
Tampa, Fla.*	23			2.25														1.00†			
					5.00 p. m.	5.50 p. m.	0.47	0.03	0.05	0.09	0.14	0.20	0.23	0.26	0.30	0.34	0.37				
					5.50 p. m.	6.40 p. m.		0.40	0.42	0.44	0.47	0.51	0.60	0.64	0.68	0.70	0.72				
					6.40 p. m.	7.30 p. m.		0.76	0.80	0.83	0.85	0.88	0.92	0.95	0.98	1.00	1.04				
					7.30 p. m.	8.20 p. m.		1.10	1.17	1.25	1.32	1.35	1.37	1.40	1.42	1.44	1.45				
					8.20 p. m.	9.10 p. m.		1.47	1.49	1.50	1.51	1.53	1.55	1.57	1.59	1.61	1.64				
					9.10 p. m.	10.00 p. m.		1.66	1.69	1.71	1.73	1.74	1.75	1.76	1.77	1.78	1.79				
					10.00 p. m.	10.50 p. m.		1.80	1.81	1.82	1.84	1.85	1.86	1.88	1.90	1.94	1.96				
					10.50 p. m.	11.40 p. m.		1.97	1.98	2.00	2.02	2.04	2.09	2.12	2.19	2.22	2.24				
Vicksburg, Miss.	5-6	11.15 a. m.	10.50 a. m.	6.30	11.40 p. m.	12.30 a. m.		2.26	2.27	2.28	2.30	2.32	2.39	2.48	2.54	2.57	2.58				
					12.30 a. m.	1.20 a. m.		2.60	2.74	2.78	2.85	2.88	2.95	3.12	3.22	3.26	3.30				
					1.20 a. m.	2.10 a. m.		3.36	3.43	3.49	3.56	3.61	3.64	3.68	3.72	3.75	3.76				
					2.10 a. m.	3.00 a. m.		3.77	3.78	3.79	3.81	3.83	3.86	3.89	3.92	3.98	4.05				
					3.00 a. m.	3.50 a. m.		4.09	4.12	4.15	4.18	4.23	4.25	4.29	4.31	4.34	4.37				
					3.50 a. m.	4.40 a. m.		4.41	4.43	4.44	4.46	4.47	4.49	4.51	4.53	4.57	4.60				
					4.40 a. m.	5.30 a. m.		4.64	4.66	4.70	4.73	4.77	4.81	4.84	4.87	4.90	4.93				
					5.30 a. m.	6.20 a. m.		4.95	4.97	4.99	5.01	5.03	5.04	5.06	5.07	5.09	5.11				
					6.20 a. m.	8.20 a. m.		5.13	5.16	5.17	5.19	5.21	5.24	5.25	5.27	5.28	5.50	5.33	5.40	5.48	5.55
Washington, D. C.	24	7.15 p. m.	9.48 p. m.	0.57	8.00 p. m.	8.35 p. m.	0.03	0.04	0.14	0.34	0.42	0.47	0.50	0.54							
Wilmington, N. C.	14			0.79													0.52				
Yankton, S. Dak.	22-23			0.14													*				
Basseterre, St. Kitts	7			0.35										0.35							
Bridgetown, Barbados	1			0.71														0.52			
Colon, U. S. C.	9	6.10 a. m.	7.45 a. m.	0.76	6.30 a. m.	6.51 a. m.	0.01	0.13	0.23	0.39	0.55	0.59	0.60	0.64	0.67	0.70	0.72				
Do	18	7.10 p. m.	11.45 p. m.	1.40	8.15 p. m.	9.05 p. m.	0.19	0.04	0.13	0.33	0.54	0.73	0.82	0.86	0.88	0.99	1.09	1.12			
Kingston, Jamaica	2	12.23 p. m.	3.00 p. m.	0.59	1.08 p. m.	1.23 p. m.	T.	0.11	0.31	0.47	0.49										
Port of Spain, Trin.	13			0.37											0.37						
San Juan, Porto Rico	5			0.36						0.26											

* Record incomplete on account of snow or other causes. † Estimated.

TABLE X.—*Excessive precipitation, by stations, for January, 1899.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
	Inches.	*Inches.*		*Ins.*	*h.m.*	
Alabama.						
Newton		4.43	6			
Arkansas.						
Amity		3.95	13			
Brinkley		5.70	13			
Conway		3.25	12-13			
Hot Springs		3.31	13-14			
Little Rock		3.60	12-13			
Lonoke	11.19	6.62	12-13			
Malvern		4.08	13			
Newport		2.96	13			
Osceola		4.05	12-13			
Picayune		2.87	13			
Pine Bluff		2.95	13			
Prescott		5.00†	12			
Stamps		2.86	12-13			
Stuttgart		4.01	13			
Washington		7.13	12-13			
Wiggs		4.19	12-13			
California.						
Anada	13.03					
Bear Valley	11.95					
Bowmans Dam	14.11	3.30	2-3			
Do		3.09	11-12			
Crescent City	11.06					
Cuyamaca		3.60	10-11			
Edmanton	13.12	4.99	1-2			
Elsinore		2.73	10			
Fordyce Dam	10.84					
Fort Ross	20.83	4.30	1			
Do		7.03	9-10			
Do		5.68	12-13			
Grass Valley	10.76	2.78	10			
Healdsburg	15.33	3.46	10			
Do		4.61	14			
Laporte	12.95					
Los Gatos		3.40	9-10			
Malakoff Mine	10.88	2.80	9-10			
North San Juan	10.25					
Peachland	16.16	6.00	9-10			
Do		4.90	13-14			
Pilot Creek	10.81	3.79	2			
Quincy		3.08	1			
Red Bluff		4.04	9-10			
Redding		2.50	1			
Rosewood		3.52	9-10			
Shasta	12.42	3.87	1			
Do		3.09	9			
Do		2.57	14			
Summerdale		2.51	2			
Do		2.84	9-10			
Ukiah	10.54					
Ventura		3.25	10			
Florida.						
DeFuniak Springs		3.50	6			
Earnestville		2.85	31			
Key West				1.40	0 32	18
Do				1.15	0 40	23
Tampa				1.00+	1 00	23
Georgia.						
Fitzgerald		2.91	16			
Fort Gaines		2.92	7			
Morgan		3.50	10			
Kentucky						
Alpha		2.50	5			
Fords Ferry		2.70	12-13			
Hopkinsville		3.39	13-14			
Leitchfield		3.30	12-13			
Lexington		2.58	12-13			
Loretto		2.95	12-13			
Richmond		3.00	13			
Russellville		3.59	13-14			
Shelby City		2.70	13			
Williamsburg		2.95	5-6			
Louisiana.						
Abbeville		2.52	16			
Alexandria	10.85	6.00	6			
Clinton		4.10	5-6			
Grand Coteau	10.42	6.33	5-6			
Jennings	14.01	8.44	5-6			
Lake Charles	12.32	5.95	5-6			
Liberty Hill		3.85	4			
Oakridge		6.10	5-6			
Plaquemine		2.60	16			
Rayne	11.23	6.17	5-6			
Shellbeach		3.40	5			

TABLE X.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
	Inches.	*Inches.*		*Ins.*	*h.m.*	
Louisiana—Continued.						
Sugartown	11.03	8.33	5-6			
White Sulphur Springs		5.30	6			
Mississippi.						
Briers	10.96					
Brookhaven	10.42					
Canton	13.25	8.97	5-6			
Edwards	10.73	6.67	5-6			
Fayette	10.35	5.10	5-6			
French Camps		3.60	6			
Greenwood		4.47	4-5			
Louisville		3.40	5			
Natchez	11.05	7.25	5-6			
Palo Alto		3.05	6			
Port Gibson	12.12	6.93	5-6			
Vicksburg	10.37	6.30	5-6			
Walnut Grove	11.48	2.88	5-6			
Woodville		4.96	5-6			
North Carolina.						
Mana		2.95	5-6			
Oakridge		3.56	5-6			
Salem		2.74	6			
Saxon		3.25	6			
Oregon.						
Astoria	18.84	3.22	19-20			
Bay City	23.53	2.60	14			
Do		5.50	20-21			
Cascade Locks	15.34					
Fairview	12.36					
Falls City	15.69					
Gardiner	13.06					
Glenora	30.08	4.31	15			
Do		5.25	19			
Government Camp	20.79	3.04	15			
Do		2.69	31			
Kerby	12.49					
Langlois	12.31					
Nehalem	24.04	8.76	19-20			
Newport	13.24					
Tillamook Rock	10.06					
Toledo	13.80					
South Carolina.						
Central		2.51	6			
Spartanburg		2.60	6-7			
Tennessee.						
Bolivar		2.68	24			
Columbia		2.55	27			
Elk Valley		3.10	6			
Erasmus		3.77	5-6			
Lynnville		3.07	5-6			
Oakhill		2.50	6			
Tullahoma		3.00	5-6			
Union City		3.00	13			
Yukon		3.24	6			
Texas.						
Alvin		2.65	26-27			
Danevang		3.18	27			
Galveston	10.39	2.87	26-27	1.77	0 43	9-10
Hulen		3.23	26-27			
Sabine Pass		4.25	5			
Virginia.						
Colemans Falls		2.96	5-6			
Columbia		2.50	6			
Doswell		2.95	6			
Washington.						
Aberdeen	17.67					
Ashford	11.95					
Brinnon	12.19					
Cedar Lake	19.14	2.50	21			
Clearwater	24.28	4.12	20			
Fort Canby	15.48	4.65	19-21			
Grandmound	11.28					
Mayfield	10.70					
Neah	21.62					
Northbend	12.18					
Olympia	12.60					
Snoqualmie	11.34					
Southbend	19.83	3.50	20			
Stampede	12.34					
Tunnel	13.80					
Union	15.65					
West Indies.						
Colon				1.03	0 45	18

† Estimated.

TABLE XI.—*Data furnished by the Canadian Meteorological Service, January, 1899.*

Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.63	29.78	−.07	20.3	− 3.5	27.5	13.1	4.64	.....	24.5
Sydney, C. B. I.	29.90	29.94	+.04	21.0	+ 0.5	30.2	11.7	4.72	−0.09	28.0
Halifax, N. S.	29.90	30.04	+.08	24.9	+ 3.1	33.8	16.0	5.09	−0.60	11.4
Grand Manan, N. B.	29.97	30.02	+.03	24.8	+ 1.4	34.0	15.6	4.43	−0.94	17.4
Yarmouth, N. S.	29.96	30.04	+.02	27.3	+ 1.0	35.1	19.5	6.22	+1.00	13.3
Charlottet'n, P. E. I.	29.92	29.96	.00	18.1	+ 1.1	26.5	9.7	4.13	+0.72	28.1
Chatham, N. B.	29.95	29.97	−.05	10.8	+ 1.0	21.8	− 0.2	2.91	−0.37	24.8
Father Point, Que.	29.97	30.00	−.04	9.7	+ 1.7	19.3	0.0	0.92	−1.78	7.3
Quebec, Que.	29.69	30.05	−.01	11.0	+ 1.9	19.2	2.8	2.42	−1.25	18.3
Montreal, Que.	29.87	30.10	+.02	15.0	+ 3.3	24.5	5.5	4.62	+1.34	25.1
Rockliffe, Ont.	29.80	30.05	−.01	8.2	+ 1.7	20.7	− 4.4	1.97	−0.04	17.7
Ottawa, Ont.	29.72	30.06	.....	13.5	+ 3.9	24.7	2.4	2.16	.....	14.1
Kingston, Ont.	29.75	30.09	+.01	20.0	+ 2.9	28.8	11.2	2.15	−1.11	7.5
Toronto, Ont.	29.70	30.10	+.01	23.2	+ 1.8	31.1	15.3	2.87	+0.36	4.7
White River, Ont.	28.57	30.05	−.06	−1.2	− 0.8	13.1	−15.6	1.49	+0.16	14.9
Port Stanley, Ont.	29.43	30.11	+.02	22.9	+ 0.7	30.1	15.7	2.97	+0.29	8.3
Saugeen, Ont.	29.30	30.06	.00	21.1	+ 0.7	28.3	13.8	3.96	+0.50	29.4
Parry Sound, Ont.	29.31	30.05	−.03	14.4	+ 0.6	24.7	4.2	7.28	+4.13	57.5
Port Arthur, Ont.	29.24	30.00	−.11	3.2	+ 0.1	13.3	− 6.8	0.50	−0.31	5.0
Winnipeg, Man.	29.12	30.04	−.15	−4.8	+ 2.0	5.7	−15.2	1.77	+1.11	17.7
Minnedosa, Man.	28.05	30.04	− .13	−2.7	+ 4.5	6.8	−12.2	0.57	−0.06	5.7
Qu'Appelle, Assin.	28.58	30.04	−.13	−1.1	+ 2.7	6.8	− 9.0	1.33	+0.95	13.1
Medicine Hat, Assin.	27.58	30.02	−.17	13.0	+ 7.5	23.0	3.1	1.12	+0.79	11.2
Swift Current, Assin.	27.30	30.08	−.11	7.1	+ 4.0	14.9	− 0.8	0.62	+0.01	5.9
Calgary, Alberta	26.24	29.97	−.22	13.2	+ 4.8	23.5	3.0	0.85	+0.28	8.5
Banff, Alberta	25.19	30.03	.....	15.6	.....	22.7	8.5	1.88	.....	18.8
Edmonton, Alberta	27.53	29.99	−.16	9.2	+ 7.4	18.0	0.4	1.09	+0.36	10.1
Prince Albert, Sask.	28.32	29.99	.....	−6.5	+ 1.9	3.4	−16.4	1.96	.....	19.6
Battleford, Sask.	28.17	30.08	.....	−2.5	+ 3.4	6.4	−11.4	0.37	.....	3.5
Kamloops, B. C.	28.70	30.04	.....	24.9	.....	30.2	19.5	1.28	.....	8.0
Esquimalt, B. C.	29.95	29.98	.....	39.2	+ 1.1	43.2	35.2	5.00	.....	12.6
Hamilton, Bermuda.	30.04	30.20	+.10	63.8	+ 1.8	68.9	58.7	5.10	.....	

Chart I. Tracks of Centers of High Areas, January, 1899.

Chart I. Tracks of Centers of High Areas. January, 1899.

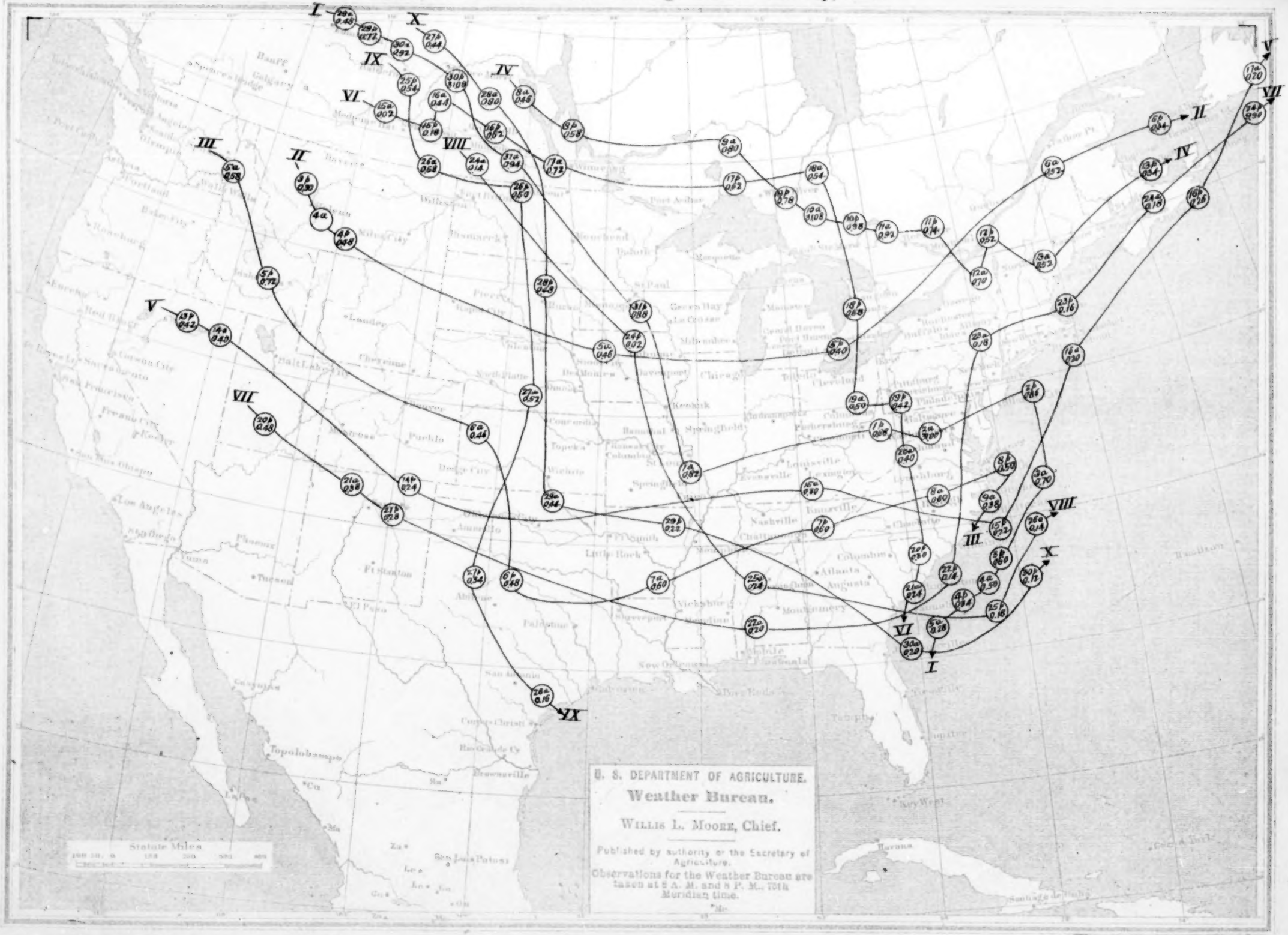


Chart II. Tracks of Centers of Low Areas. January, 1899.

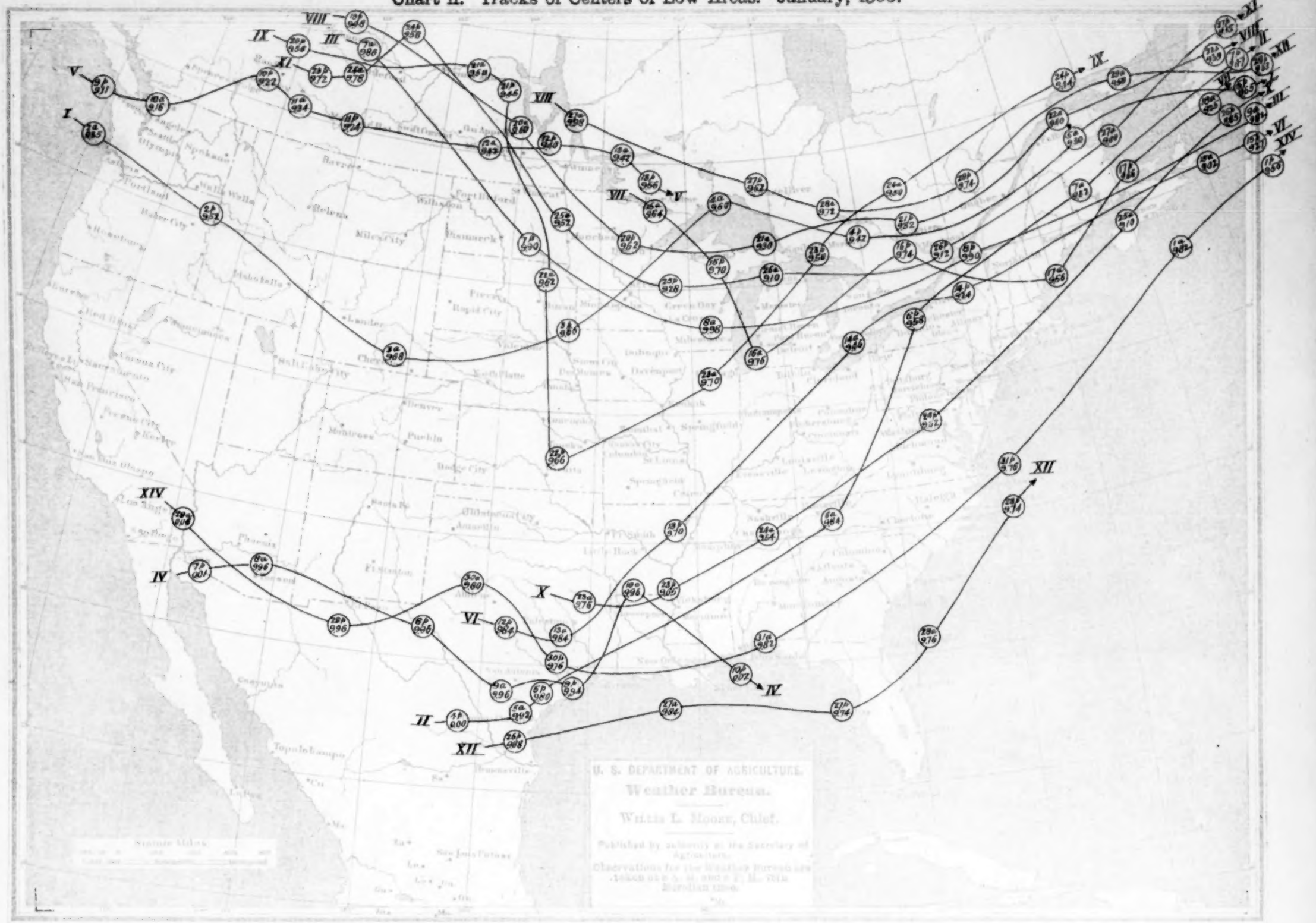


Chart III. Total Precipitation. January, 1899.

Chart III. Total Precipitation. January, 1899.

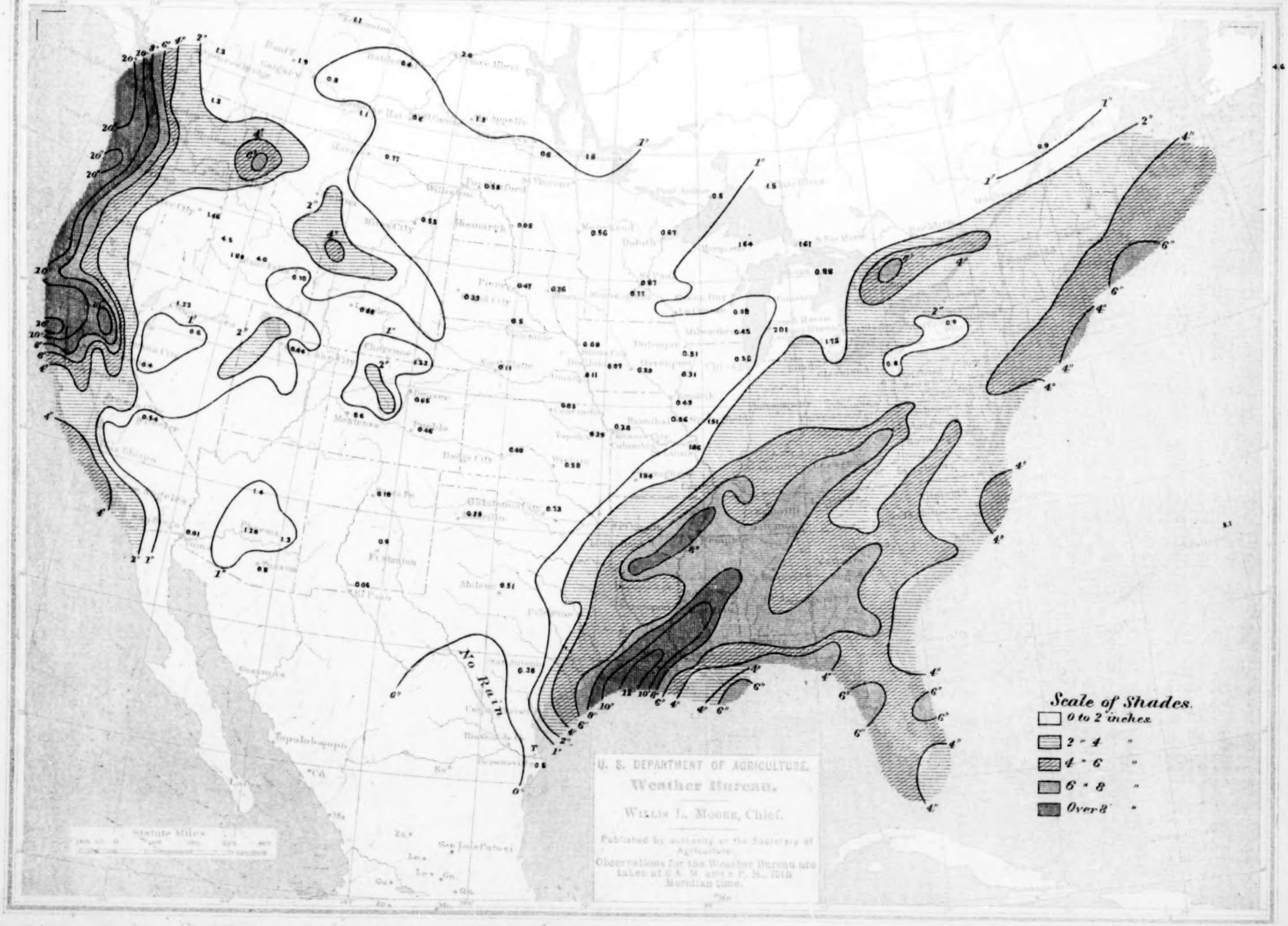
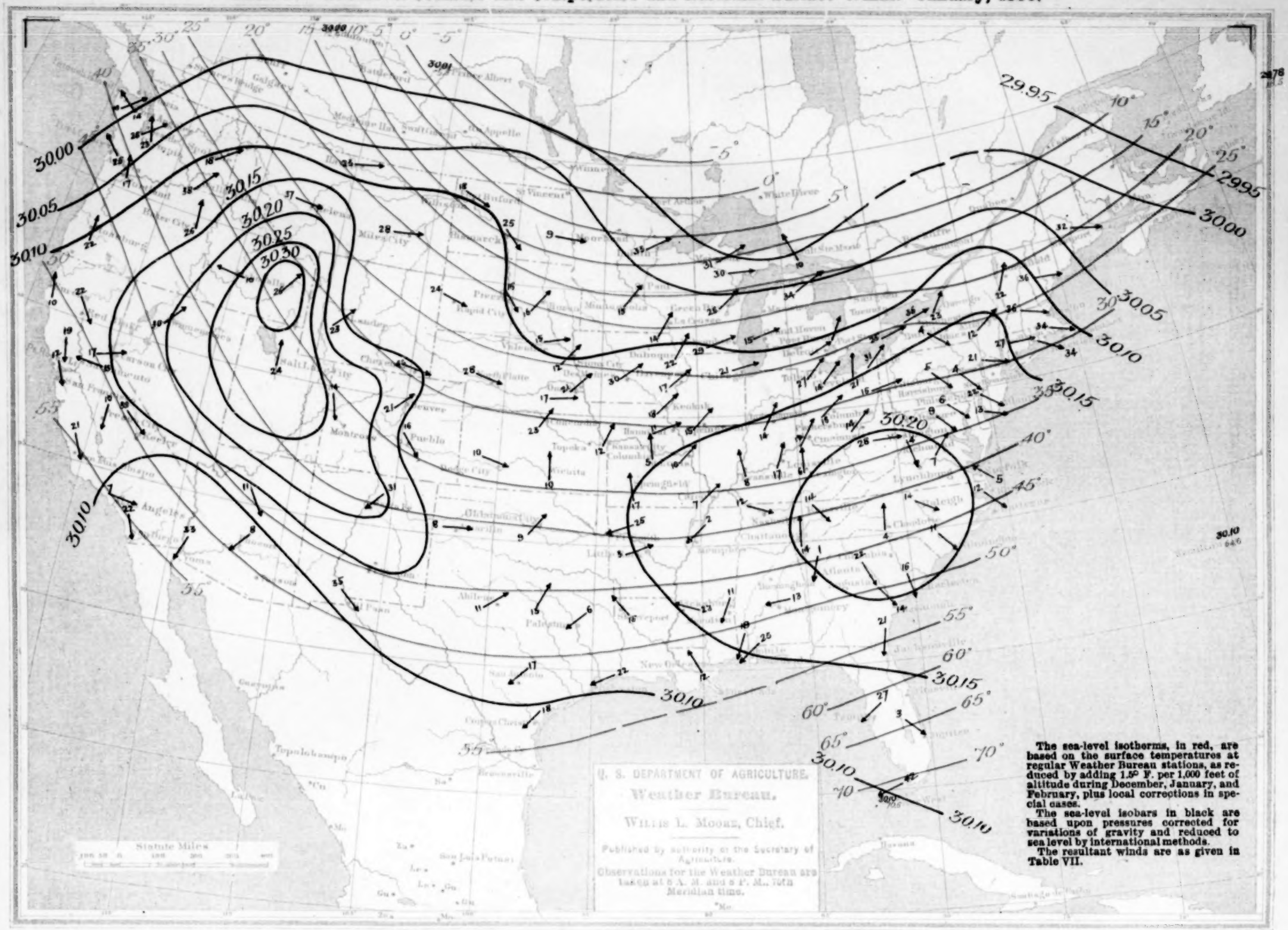


Chart IV. Sea-Level Pressure and Temperature and Resultant Surface Winds. January, 1899.



The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 1.5° F. per 1,000 feet of altitude during December, January, and February, plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea level by international methods.

The resultant winds are as given in Table VII.

Chart V. **Hydrographs for Seven Principal Rivers of the United States. January, 1899.**

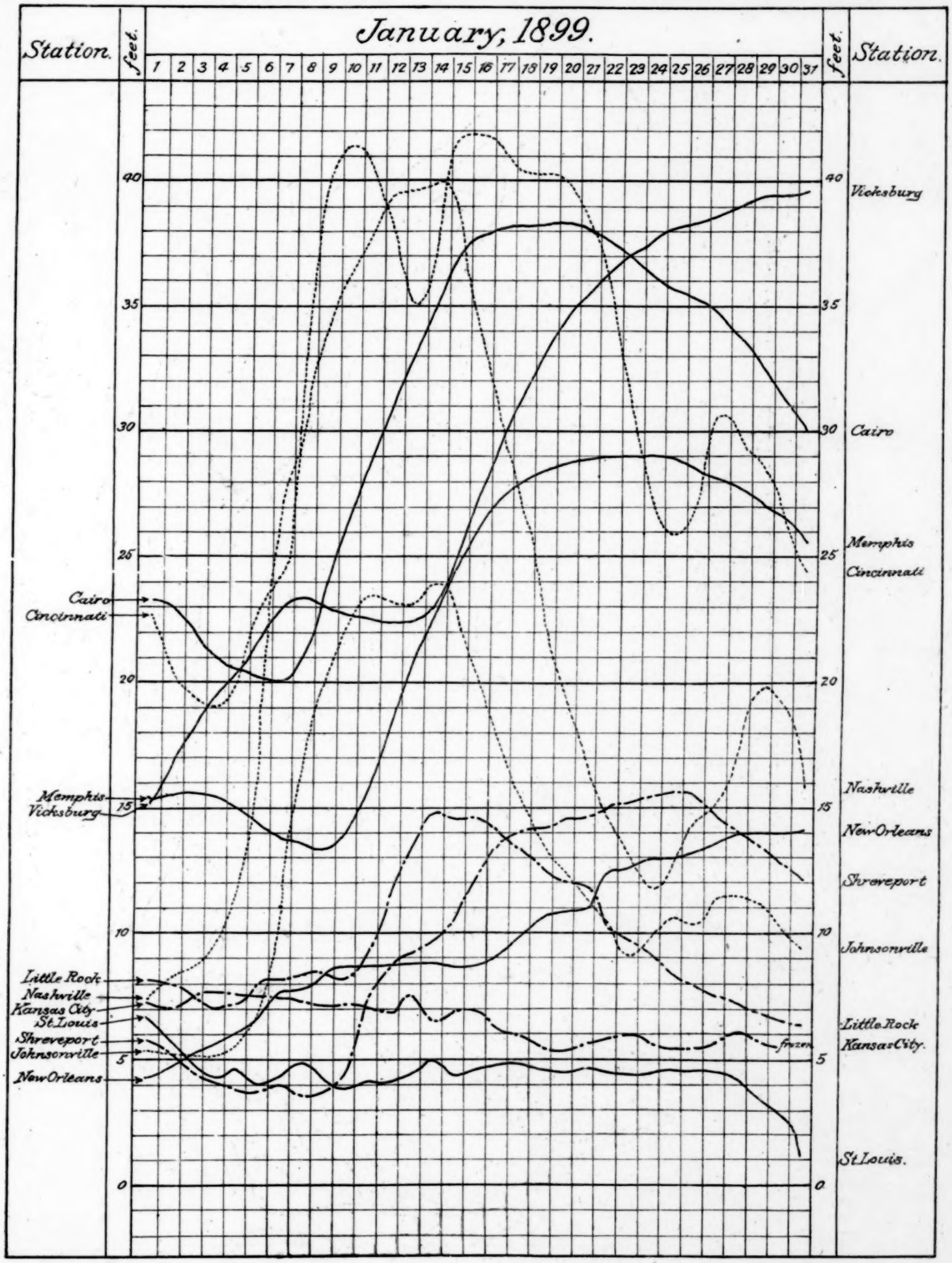


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. January, 1899.

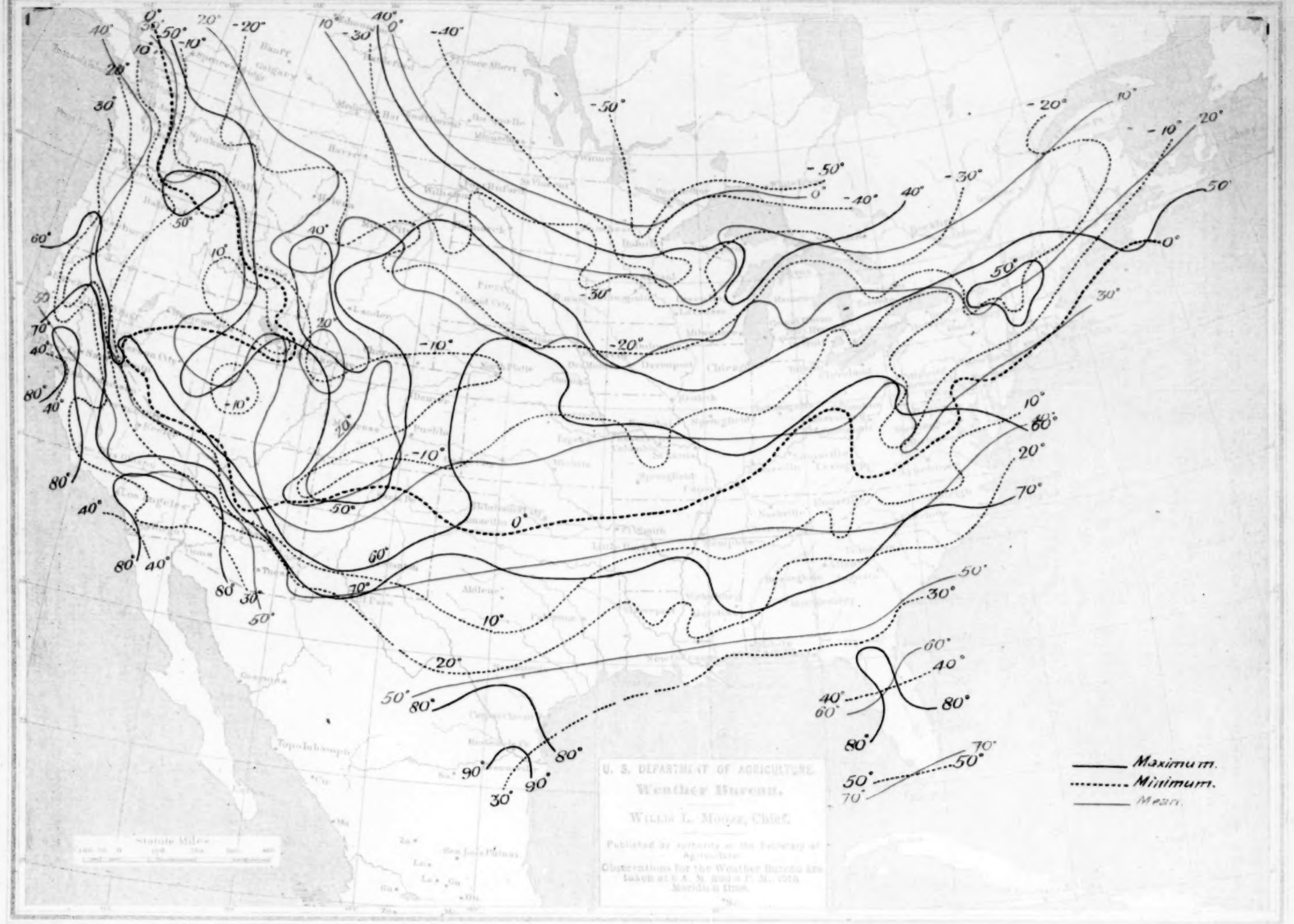


Chart VII. Percentage of Sunshine. January, 1899.

Chart VII. Percentage of Sunshine. January, 1899.

Chart VIII. Total Snowfall. January, 1899.

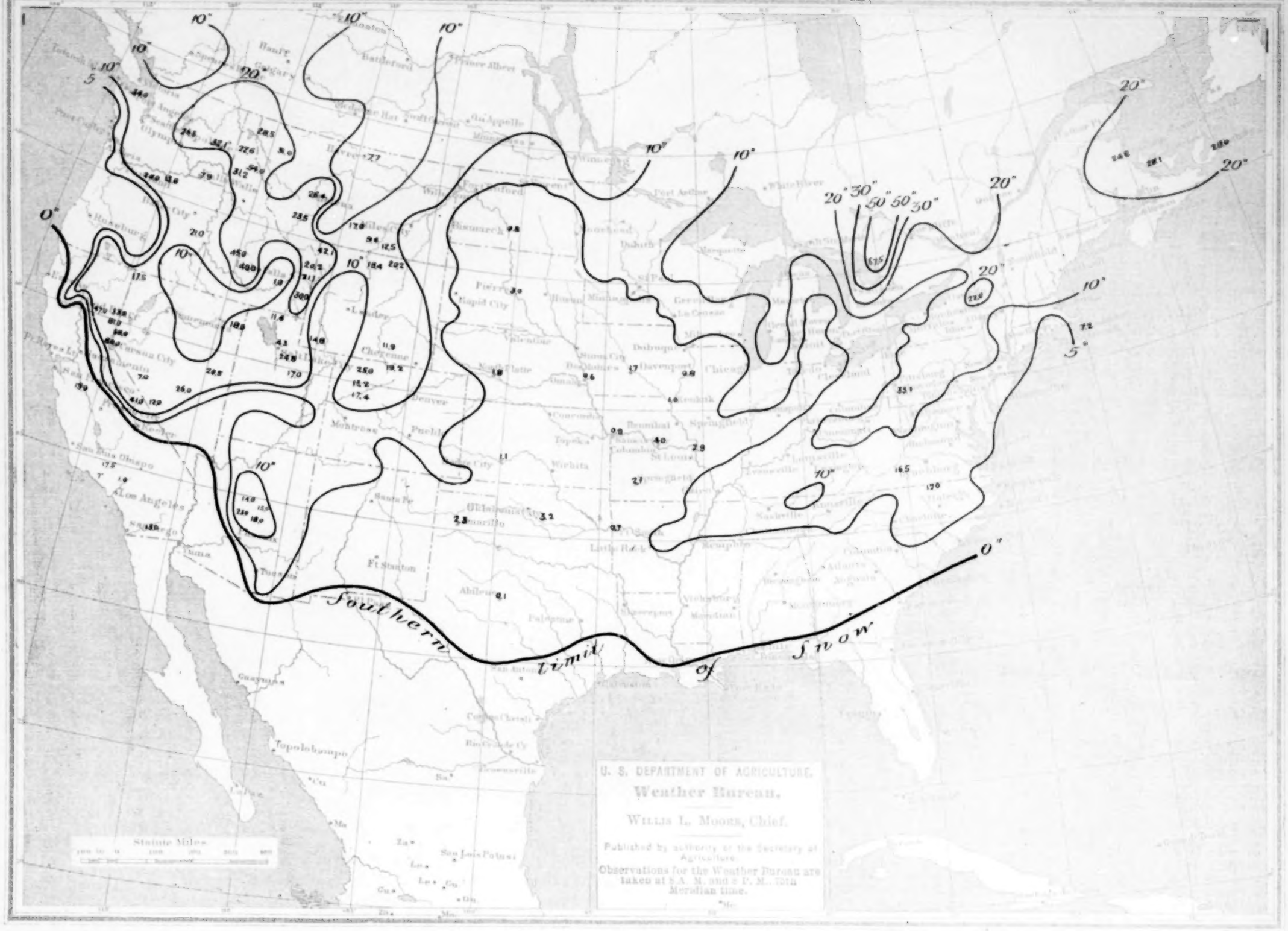


Chart IX. Snow on ground at the end of the month. January, 1899.

Chart IX. Snow on ground at the end of the month. January, 1899.